AUG 25 1942

TELEPHONE ENGINEER

and Management

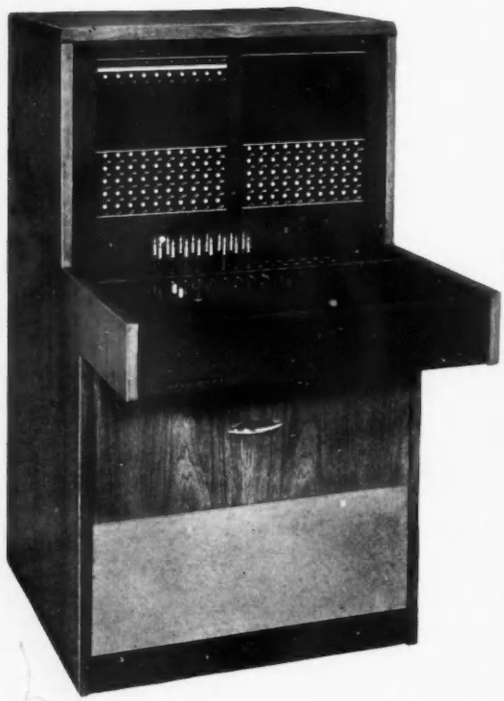
KEEP 'EM TALKING

AUGUST 15, 1942

Entered as Second Class Matter at the Post Office at Pontiac, Ill., under the Act of March 3, 1879.

BUILT FOR 168 HOUR WORK WEEK

Leich P-B-X's are serving in many manufacturing plants recently converted to 24-hour, 7-day war schedules. Modern, rugged and dependable; they are ideally suited to the job. They are available with a variety of line, trunk and cord circuit combinations to meet virtually every operating condition. Leich engineers will be pleased to submit specifications and full details on units to meet war-plant requirements in your operating area. Deliveries, naturally, are contingent upon urgency—as evidenced by preference rating certificates.



LEICH SERVICE

Leich Sales Corporation

427 West Randolph Street, Chicago, Illinois

To Assure Uninterrupted Service . . .
To Conserve Vital Materials . . . .

Guard the Extra Life

BUILT INTO YOUR EQUIPMENT

It is a grave responsibility that has been entrusted to telephone men these days. To carry on for the duration with existing equipment calls for utmost ingenuity and ability. But then, telephone men are used to meeting emergencies and overcoming difficulties with a will and a way that has stood the country in good stead so many times in the past.

Fortunately, telephone equipment is built for long service life. Kellogg-equipped exchanges, for example, can be depended upon to handle wartime overloads fast and efficiently. That's because of the reserve—the extra margin—of quality built into Kellogg equipment down to the smallest part.

The big task ahead is to guard that extra life with greatest care. Telephone men need to be increasingly vigilant. They will make periodic, thorough inspection of entire plants to forestall possible interruptions to service. They will watch points most subject to damage or break down, ready at the first sign of wear to make repairs quickly, with a minimum of materials.

Shown opposite is a brief review of some of the points recommended in a campaign to assure longer service and extra life of vital parts and apparatus. Alert telephone men will find this listing useful in checking their routine work. They will do so in the gratifying knowledge that they are adding incalculably to the efficiency of the war effort . . . at the same time conserving materials so urgently needed by the Armed Forces.

Further and more detailed information on wartime routining of equipment is available from your Kellogg representative.

CALL IN THE KELLOGG SERVICE REPRESENTATIVE

Yes, he's the Kellogg "Service" Representative now. He is at your service in three important ways. He is qualified by long experience to help you keep your equipment at highest operating efficiency. He is equipped to help you secure such repair materials as you urgently need and can purchase within the bounds of existing priorities. And he is ready to work closely with you on all problems involving new or expanded telephone facilities at army camps, air fields, war factories, etc. You are urged to turn his ability to your advantage in every possible way.

KELLOGG SWITCHBOARD & SUPPLY CO., CHICAGO, ILL.

KELLOGG

TIPS ON MAKING EQUIPMENT LAST LONGER

GENERAL

Review material and supply stocks and keep essential inventory stocks available for use in case of emergency. Offer or trade usable but unneeded items for sale to other companies.

Conserve time and tires by carrying all required tools, materials and spare parts on all trips in order to reduce return trips.

Consult records of equipment installations . . . lines, poles, protectors, instruments, etc. . . . as an aid in establishing "Preventive Maintenance" practices to eliminate service failures.

Compile list of all local persons familiar with telephone work, for quick mobilization in case of emergency.

Check all joints, inside the plant and out, for poor electrical connections, using small voltmeter test sets for locating bad joints.

EXCHANGE BUILDING

FIRE PROTECTION—Provide adequate fire-fighting equipment. . . . Issue instructions and give periodic demonstrations to all employees on proper methods of using equipment. Contact insurance inspectors for advice on minimizing fire hazards. . . . Show local fire department representatives over the premises so they will get to know the best methods and materials to use in protecting central office equipment from water and chemical damage.

Provide emergency lighting for use in case of "black-out" or power supply failure. Flashlights and electric lanterns are good substitutes. Inspect emergency lighting equipment periodically.

SWITCHBOARD

Keep switchboard clean, inside and out. Use vacuum cleaner or blower on jacks, keys, etc.

Remind operators to handle cords, keys and plugs carefully to increase service life and avoid breakage. To disconnect, for example, grasp the plug, not the cord.

Repair worn cords promptly. Replace badly worn cords if possible.

Clean and polish plugs regularly with non-corrosive and non-abrasive polish or cloths.

Test drop and jack sleeves, plugs, jack springs and keys frequently.

Gauge plug and jack assemblies. On Common Battery equipment, replace work jack strips and send to factory to be re-worked. On Magneto equipment replace worn thimbles.

Be sure to use cords and plugs of the best quality.

Re-use jumper wire where possible during the war emergency.

Keep relay covers on except while clearing trouble.

In making repairs be careful to do the best possible job. Keep cables and wiring in proper place. Handle wire carefully to protect insulation.

Make periodical tests of all cord and line circuits.

In general, attempt to detect faults that may develop into acute cases of trouble affecting service and efficiency. Keep spare parts available for emergency use.

MAIN FRAME

Clean periodically.

Check for loose connections.

Repair or replace damaged arrestors.

Check for good soldered connections on protector block and line block.

Check both line and cable side of terminals and arrestors for unsoldered joints.

Check heat coils and replace those having high resistance.

POWER

Maintain good charging and ringing equipment.

Be sure to have a sufficient reserve battery supply to carry the load during "black-outs" and other emergencies.

Consider provision for auxiliary power source to operate in case of failure of commercial power.

Keep storage battery connectors and terminals clean and free from corrosion.

Check batteries regularly for charge and voltage. Keep specific gravity of electrolyte near the correct reading 1.210 or 1.220 at 77°, when fully charged.

DO NOT OVER-CHARGE OR UNDER-CHARGE BATTERIES.

Keep batteries on full-floating charge if possible, to insure long life and even voltage.

Add water (distilled only) as required.

On motor-generator sets, remove brushes once a month, and wipe brushes, brush holders and commutator with a clean, dry cloth. **Follow manufacturer's instructions on lubrication.**

On ringing equipment using motor-generator, dynamotor and rotary converters, check lubrication once a week.

Check ringing frequencies daily.

Keep power control panel clean.

OUTSIDE PLANT

Check over cable protection against lightning and foreign currents.

Patrol cable for ring cuts; Replace with Flat Type hangers, if necessary.

Use grade clamp to prevent cables from pulling at vital points.

Where rings are used for suspended cables, take steps to prevent vicious cutting at each side of pole. Use Flat Type hangers.

Trim trees that rub cable sheaths. Use TREE GUARDS where necessary.

Check all cable terminals of protected type. Be sure all connections are tight.

Check sagging electric power lines that may endanger telephone cables or supports.

Take up excess slack on line wire and drops.

Avoid the use of old, rusty wire. Use compression joints where possible.

Check guys for proper position and tension.

Replace weak poles.

Replace missing or broken pins and insulators.

Re-fasten loose wires to insulators, straighten and tighten.

Test joints with a meter.

Check ground rods or ground attachments.

Replace drops that fail under wet conditions.

SUB-STATION EQUIPMENT

Place all telephones in good shape, both those in service and in stock.

Check transmitters and receivers for efficiency.

Send in old transmitters for repairs to keep up transmission standards.

Check and repair all sub-station protectors, protector grounds and connections.

Ask subscribers to help reduce telephone breakage and cord wear by handling instruments carefully.

EXTRA EDITION

Telephon

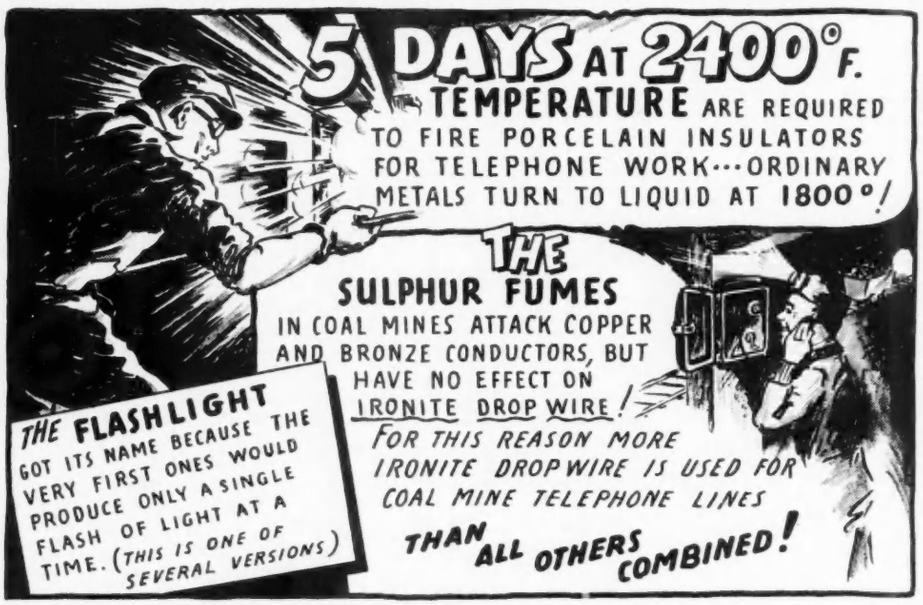
An Advertisement of Leading Supply Manufacturers Whose Prod

PUT YOUR LINE SUPPLY

MATHEWS STAZRITE GUY GUARDS ARE INSTALLED WITHOUT SPECIAL TOOLS

Public approval as well as that of telephone men is behind Mathews Stazrite Guy Guards. Guy rods and wires are rendered visible and *safe*. Easily installed without special tools, they consist of one piece only which is attached to the guy strand at the upper and guy clamp at the lower end. Galvanizing on guard and strand will not be scarred or crushed when attaching. Available in two types — "Half Round" and "Full Round."

ODD.....BUT TRUE !


5 DAYS AT 2400° F.
TEMPERATURE ARE REQUIRED TO FIRE PORCELAIN INSULATORS FOR TELEPHONE WORK···ORDINARY METALS TURN TO LIQUID AT 1800°!
THE SULPHUR FUMES IN COAL MINES ATTACK COPPER AND BRONZE CONDUCTORS, BUT HAVE NO EFFECT ON IRONITE DROP WIRE!
FOR THIS REASON MORE IRONITE DROPWIRE IS USED FOR COAL MINE TELEPHONE LINES THAN ALL OTHERS COMBINED!
THE FLASHLIGHT GOT ITS NAME BECAUSE THE VERY FIRST ONES WOULD PRODUCE ONLY A SINGLE FLASH OF LIGHT AT A TIME. (THIS IS ONE OF SEVERAL VERSIONS)

Shocks Never Affect "WT" Glass Insulators

That's only one of the many advantages of "WT" Insulators. Other outstanding characteristics are crystal clarity of glass, which guards against malicious breakage; accurate gaging to assure true pin fit; exceptional durability; and the ability to withstand severe temperature changes.

Armstrong Cork Company leaves nothing to guesswork in making "WT" Glass Insulators. Every stage of production is automatically controlled . . . every insulator conforms to A.S.T.M. standards. When you specify "WT" insulators in your Kellogg order you are assured of top-notch troublefree service.

INDIANA STEEL STRAND WIRE PAYS DIVIDENDS

High adaptability, moderate first cost and long life assure excellent dividends from your investment in Indiana Crapo Steel Strand wire. It is first choice with telephone men everywhere. Lasting protection against corrosion is provided by the heavy, ductile, tightly-adherent zinc coating applied by the famous patented Crapo process. The superior tensile strength of steel, the ability to outlast normal needs, plus the Crapo protection against corrosion make this wire the safest and surest bet for all construction work.

Automatic Ventilator In Churchill Booth

Here is a telephone booth the public likes to use, especially in warm weather. This famous booth made by the Churchill Cabinet Company is a profitable unit wherever installed. It is soundly constructed, correctly designed and beautifully finished. The special acoustic design provides privacy and talking comfort. The silent electric ventilator and the ceiling light are both operated by an automatic door switch. Choice of woods and finishes: selected kiln dried lumber: skilled cabinet makers, are added features.

Phone Facts

EXTRA EDITION

Are Distributed by the Kellogg Switchboard and Supply Company

NEEDS UP TO KELLOGG

Ironite Drop Wire Is Strong and Flexible

This is the second war in which Ironite Drop Wire has saved critical materials by its long life. Although it lasts longer, it meets all service requirements. It is unusually strong, effectively resisting sleet loads on long spans. Other important features are

high conductivity—Ironite No. 18 BWG is equal to No. 22 B&S copper in drop wire lengths; has insulation with 10 times required dielectric qualities; is flexible—works and ties easily. To help you meet rigid budgets in replacements you will find Ironite most reasonably priced. Specify Ironite Drop Wire for good service and low cost.

KELLOGG KOILED KORDS STRETCH OUT 60 INCHES

Here is a product every phone user likes. Kellogg Koiled Kords work like a coil spring and stretch out 60 inches. Of great importance to you is the fact that these cords save telephone breakage because they rarely tangle with other objects or catch under desk or table. The action of Kellogg Koiled Kords is entirely secured by molding the outer rubber covering into the permanent coiled shape. This patented construction makes it the longest wearing cord of this type.

Operating Men Are Assured of Newest and Best Items Available

There are plenty of worries these days without having to worry about your source of line supplies. Let experts do your worrying for you. The Kellogg Company is composed of a large group of telephone men, who can judge what is needed and wanted in the field to operate better, faster, more profitably. And thru Kellogg, the operating man has the pick of the finest materials and developments of the best manufacturers!

Most telephone men realize that one of the ways to operate most economically and profitably, is by being on the alert for new ideas, new products, new methods, etc. Were any one man to do this, however, it would be necessary for him to devote almost his full time to the task.

There is a shorter, easier way than this for the telephone man to keep abreast of new developments. Kellogg, because of its understanding of the operating man's problems, is the nerve center of what's new and good.

Most of the supply manufacturers know this. They know that Kellogg will recognize the need or application for a new product or method. They know likewise, that Kellogg representatives, and advertisements like the one on this page will spread the news.

LIGHTNING ARRESTERS PROVIDE SCORES OF EXCLUSIVE FEATURES

Numerous functional and construction features are exclusive with the Cook No. 7 Lightning Arrester, equipped with non-grounding Tru Gap Dischargers. Ten wire capacity, for mounting on pole or cross arm; will shunt to ground high potentials included on open leads. Provides protection to cable from exposed drops connected to unprotected terminals. Installed on open leads near their connection to a protected pole cable terminal the No. 7 Lightning Arrester will prevent excessive fuse operation.

Offset Dead-Ends Are Efficient and Simple

The simplest, easiest and cheapest method of dead-ending is with Nicopress Offset Dead-Ends. And when you find that it is the most economical way too, then you know for sure that this is the answer to your dead-ending problems. Any lineman can quickly make better dead-ends with Nicopress Offset Dead-End Sleeves. When dead-ends are made *this* way the conductors will not pull out, and the completed dead-ends exceed the rating breaking strength of the conductors. The same tool is used as in making Nicopress line splices. Try them.

FWD dealers and branches have signed the Office of Defense Transportation Pledge and are qualified to display this official poster.

The Entire National Organization of FWD Supports The U. S. Truck Conservation Corps Campaign with Full Cooperation and Participation

WE are pledged to do our part . . . we are wholeheartedly supporting the Office of Defense Transportation in its job of enlisting the owners and drivers of the nation's 5,000,000 trucks in the U. S. Truck Conservation Corps. Our branches and dealers will cooperate and participate in fullest measure to prolong the life of every existing truck . . . their facilities for periodic servicing are at the command of the nation's truck operators to get the most out of their present equipment . . . to conserve tires — gas — oil — to avoid major replacements.

Motor transport is recognized as indispensable in helping "to speed the flow and movement of farm, military and industrial products so necessary to victory." Wartime conditions have emphasized the value of keeping good trucks in sound condition . . . making them last and getting the most wear out of tires.

Building trucks that will "haul longer for less" is a tradition with the FWD organization. Many FWD's, manufactured twenty-five years ago, are still providing dependable transportation. Thousands of FWD owners regard their FWD trucks as "priceless" today when soundly-built motor trucks are so vital.

If you are not familiar with the plan of the U. S. Truck Conservation Corps — write us for full information.

THE FOUR WHEEL DRIVE AUTO COMPANY
CLINTONVILLE, WISCONSIN • *Canadian Factory:* KITCHENER, ONTARIO

FWD TRUCKS

HAUL LONGER FOR LESS

Imagine a Horseman Warning Countryside of Air Raid

PAUL REVERE RIDES FROM CHARLESTOWN TO CONCORD (APRIL 18, 1775)

AMONG the great epics of American history is Paul Revere's ride to warn the farmers of Middlesex County, Massachusetts, that the enemy's troops were coming.

But suppose today a fleet of enemy bombers was approaching—signal lights in a church tower and a lone horseman wouldn't get very far before the country would be laid waste!

Many military authorities say that in modern warfare, communications come next to fire power in importance. Having spent 48 years in the development and manufacture of materials for communication, it was only natural that Stromberg-Carlson should be among the first to answer our Country's call to engage in this important work.

Now our plant is working night and day in the production of these materials for our armed forces—all of them designed and built to the famous Stromberg-Carlson standard. Stromberg-Carlson workers are so deeply imbued with the war spirit, they have adopted as their slogan *"Help Stromberg-Carlson Help America—There Is Nothing Finer."*

Stromberg-Carlson Telephone Mfg. Co., Factory and General Offices: 100 Carlson Road, Rochester, N. Y.; Branch Offices: Chicago, Kansas City, San Francisco, Toronto

Stromberg-Carlson

MAKERS OF VOICE TRANSMISSION AND VOICE RECEPTION APPARATUS FOR FORTY-EIGHT YEARS

Number 3 in a series showing old methods of war communication

If you telephone men could see the many letters giving us change of address from readers who have joined our fighting services you would feel very proud. A number of them have been changed to embarkation points along our coast and although we do not know where they are we cannot keep from hazarding a guess as to their destination. Several have had their wives hold them in file until they return.

▼

Announcement is carried in this issue that the Sherman Hotel will be the host for the 1942 National convention. It has been a long time since Independent telephone men met at the Sherman and to many of you it will be like going home. They assure us you will be pleased over the change from the Stevens.

▼

You will also read in another part of this issue that two of our old friends from the West Coast have passed on. In the deaths of Eliot Cheadle and Ray Hannibal our industry has lost two of our prominent men. One cannot help but think how much nicer it would be to publish their accomplishments while they are here to read them.

Ray

TELEPHONE ENGINEER

MANAGEMENT · ENGINEERING · MAINTENANCE

Vol. 46, No. 8 **AUGUST, 1942**

CONTENTS

- Across the Editor's Desk..... 10
- The Pioneer's Corner..... 16
- Highlights of the Communications News by Roland C. Davies..... 19
- Convention Dates..... 20
- Text of Priority Amendments—Orders P-129 and P-130..... 21
- Wire Chief's Training Course—Cable Splicing—Section XVII..... 23
- Design Features of Audio Amplifier Circuits—by C. F. Peterson..... 25
- Personals from the Field..... 27
- Thumbnail Discussions—Wartime Maintenance by Jay G. Mitchell..... 28
- Twenty-five Years Ago this Month..... 35
- Line and Desk—edited by B. C. Burden..... 36
- Directories Sell War Bonds..... 39
- TELEPHONE ENGINEER'S Handbook Tables.... 44
- Letters from TELEPHONE ENGINEER Readers.... 48
- Kellogg Receives Treasury Citation..... 56
- Index to Advertisers..... 62

RAY W. SMITH, Editor—B. C. BURDEN, Technical Editor
ROY F. SMITH, Advertising Manager
DON C. SORENSEN, Sales Promotion Mgr.
S. J. LASKER, Circulation Mgr.—DOROTHY FULTON, Production Mgr.

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SERVING THE FIVE BILLION DOLLAR TELEPHONE INDUSTRY

Founded in 1909

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TAKE a good look at this gloating scoundrel . . . our evil enemy . . . the Axis. He's smirking, but by conservation of present materials you can help wipe off his grin. For instance, the Exide Telephone Batteries used by so many leading companies, will last a lot longer if cared for properly. Follow these rules and *Save to Win!*

Exide
TELEPHONE BATTERIES

MAKING BATTERIES LAST HELPS STOP THE AXIS!

1. Keep adding approved water at regular intervals. Most local water is safe. Ask us if yours is safe.
2. Keep the top of the battery and battery container clean and dry at all times. This will assure maximum protection of the inner parts.
3. Keep the battery fully charged—but avoid excessive over-charge. A storage battery will last longer when charged at its proper voltage.
4. Record water additions, voltage, and gravity readings. Don't trust your memory. Write down a complete record of your battery's life history. Compare readings.

If you wish more detailed information, or have a special battery problem, don't hesitate to write to Exide. We want you to get the long-life built into every Exide Battery. Ask for booklet Form 3225.

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia
The World's Largest Manufacturers of Storage Batteries for Every Purpose
Exide Batteries of Canada, Limited, Toronto

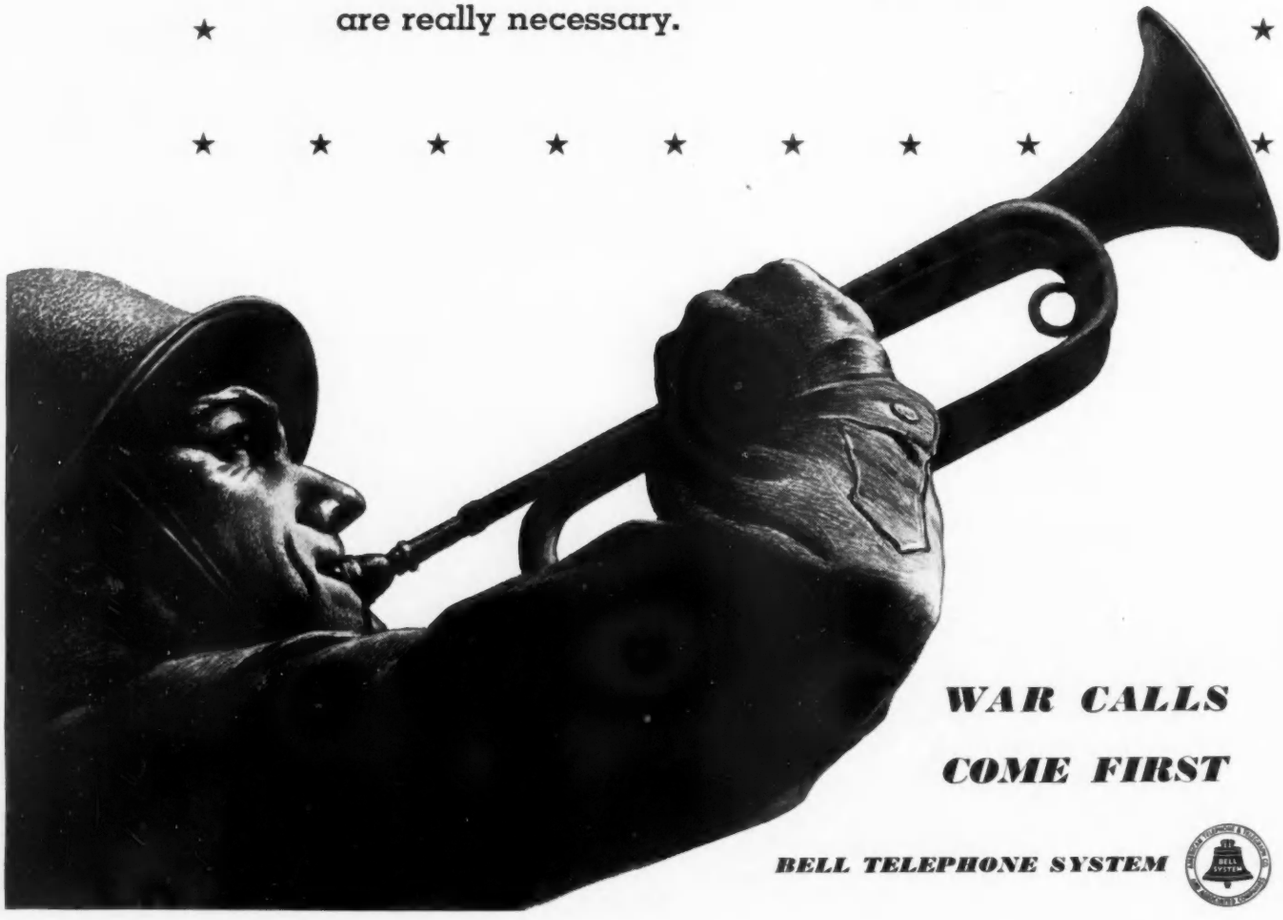
Clear the Lines for the War

Before you make a Long Distance telephone call today, ask yourself these questions:

1. Is it necessary?
2. Will it interfere with war calls?

The weight of war on the telephone lines is heavier every day. We can't build the new lines to carry it because sufficient materials aren't available. We've got to make the most of the service we now have.

Please give a clear track to the war effort by confining your Long Distance calls to those that are really necessary.



WAR CALLS COME FIRST

BELL TELEPHONE SYSTEM

ATTENTION AMERICA!

The advertisement on the opposite page is appearing in national publications during August and September. It is a simple statement of a current problem which affects the whole telephone industry.

AN ADVERTISEMENT OF THE BELL TELEPHONE SYSTEM

FOR VITAL CONNECTIONS

Although all drops are important some are vital. Monotype Drop Wire is built to serve where absolute dependability is essential. Monotype's conductors, insulation, braid and finish are of a quality that defies rain, sun, wind and ice. Now especially, with replacements practically out of the question due to the shortage of men and material, Monotype's reliability means much to busy telephone companies.

MONOTYPE DROP WIRE

MANUFACTURED FOR

AUTOMATIC ELECTRIC COMPANY

By GENERAL CABLE CORPORATION

DISTRIBUTED BY

AMERICAN

AUTOMATIC ELECTRIC

SALES COMPANY

1033 WEST VAN BUREN STREET • CHICAGO, ILLINOIS

BRANCH WAREHOUSES AT DALLAS, KANSAS CITY, LOS ANGELES, RICHMOND (VA.) AND SAN FRANCISCO

They work together better...
because they can talk together

In the last war
The pilot's warning
Could only have been expressed
By a frantic dipping
Of the plane's wings.

There was no other means
Of communication between
One plane and another.

Today, pilots of our fighters,
Scaling the sky
At better than five miles a minute
Can talk with each other
As easily as if they were lounging
In their quarters far below.

The modern radiotelephone
Links every pilot in the squadron.
As the talk goes back and forth
Each man is *instantly* aware
Of his part in the fight.

Teamwork. The kind of teamwork
That wins battles.

Modern communication equipment
Designed and manufactured
By I. T. & T. associate companies
Is helping Uncle Sam
Coordinate his fighting forces
On land, sea and in the air.

The broad, peacetime experience
Of I. T. & T.
In the field of communications
Is proving its value
In time of war.

INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION *67 Broad St., New York, N. Y.*

IT&T

Associate Manufacturing Companies in the United States
International Telephone & Radio Manufacturing Corporation
Federal Telegraph Company

MAKE THE MOST

OF THE EQUIPMENT YOU HAVE— BY USING "AR" REBUILDING SERVICE!

Type G

If you plan future automatic operation, send in your present telephones to us for economical conversion.

Both for the national welfare and for your own economy, every item of equipment you have should be utilized to the utmost. AR Rebuilding Service can help you to do this at low cost, by providing:

(1) factory rebuilding of equipment which you have on hand or in storage, but which is not in usable condition;
(2) modernization of equipment which is obsolete;
(3) conversion of unsuitable equipment to fit your present needs.

Remember, AR Rebuilding Service employs the latest factory methods applied by experienced telephone craftsmen—produces equipment that looks and performs like new! Write for prices.

THE MARK OF QUALITY IN REBUILDING SERVICE

AUTOMATIC ELECTRIC

ORIGINATORS AND DEVELOPERS OF STROWGER STEP-BY-STEP MACHINE SWITCHING AUTOMATIC DIAL SYSTEMS

MAKERS OF TELEPHONE, SIGNALING AND COMMUNICATION APPARATUS
ELECTRICAL ENGINEERS, DESIGNERS AND CONSULTANTS

Distributors in U. S. and Possessions:
AMERICAN AUTOMATIC ELECTRIC SALES COMPANY,
1033 W. Van Buren St., Chicago, U. S. A.
Export Distributors: AUTOMATIC ELECTRIC SALES COMPANY, LIMITED

THE PIONEER'S CORNER

Looking Backward

Lubbock, Texas
August 15, 2001

The other day I was looking through some old copies of TELEPHONE ENGINEER and ran across some that were published way back in 1942. I surely got a kick out of some of the advertisements that appeared in those issues. The "fine" equipment that the manufacturers were advertising is really antiquated now. I began to actually feel sorry for the fellows that had to make that "stuff" work.

I know now that time does a lot of things to our business because just a few years back, in 1992 to be exact, I doubt seriously if any of us realized that the PICTUREPHONE would be as obsolete at the turn of the 21st century as the dial systems were in 1955.

While looking through some of these copies I ran across a series of articles on Telephone Pioneering which were written by various members of Independent Pioneer Telephone Association. I read several of these articles in which the writers pictured, what they thought was, the "pioneering period" of the telephone industry. If they had only realized it, they would have known that they were only writing about the "early days" of the pioneering period. But I imagine most of them realized later on that they were just beginning the pioneering period by 1942.

But I guess those fellows back in 1942 were too worried about priorities, army camps, copper wire, tires, and gas to realize that they were actually pioneering; just like we now are worrying about getting the Plantman a new Rocket Ship, and getting this and getting that. So, I guess we also are losing sight of the fact that we are pioneering too.

But here we are in the 21st century, and things are just as "rough" as the times those fellows were writing about in those old magazines back in 1942. I'm coming to the conclusion that perhaps Telephone Pioneering covers that period of time from the beginning to the end, and from where I sit the end isn't in sight—and so, I guess we all still have a lot of pioneering yet to do.

R. B. Fairly

DAN'L H. McNULTY *Conducts*

A MARKET PLACE for listing supplies that are wanted . . . or disposing of equipment or supplies of any kind that may be used by other Independent telephone companies . . . *or for reducing surplus inventories.*

May we urge: "Don't let a day pass without buying War Bonds or War Stamps."

The use of this page is open to anybody and everybody in the Independent Telephone business.

➡ **Make available to others whatever you have that you cannot use yourself.**

KEEP IN MIND that some equipment lying unused in your warehouse may be badly needed by some other Company.

Users of this Page should list their needs or stocks in detail, and material for disposal should be graded as follows:

NEW
SLIGHTLY USED
REUSABLE
WORN

—and priced accordingly.

Sellers using this Page should agree—
(1) That the material is as described.
(2) That it will be packed, tied or crated so as to reach destination in good order.

To reduce all possible costs, shipments will be made direct from seller to buyer. Billing can be made through this office, for which a nominal charge will be made.

Suggestions or comments will be welcome.

Write us what you have and we will list it to the best advantage.

FOR SALE

NEW EQUIPMENT

- No. 10 Exchange Line Insulators
- 5/8" x 10" Galv. X-Arm Bolts
- 5/8" x 12" Galv. X-Arm Bolts

USED EQUIPMENT IN GOOD CONDITION

- No. 16 Toll Line Glass Insulators
- No. 9 Exchange Line Glass Insulators
- Galv. Guy Hooks
- Galv. X-Arm Braces—20", 24" & 28"
- Galv. 5/8" X-Arm Bolts—10", 12", 14", 16", 18" & 20" long
- Galv. 5/8" x 16" Eye Bolts
- Galv. 2¼" x 2¼" x ¾" hole Square Washers
- Galv. 3 Bolt Clamps (½" bolts)

WANTED

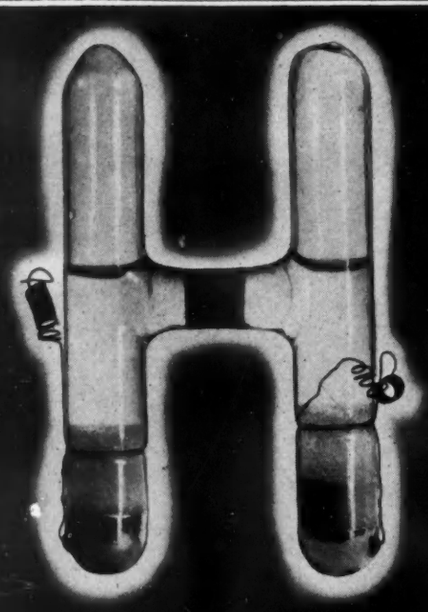
- Complete Magneto Telephones or Parts
- Western Electric or Kellogg transmitters — either grounded or metallic style
- Reusable Iron Wire
- 5/8" Nuts only for Thru Bolts
- Lineman's Portable Test Sets
- Cable Testing Sets
- Small Common Battery Switchboards

ADDRESS ALL MAIL TO... **DAN'L H. McNULTY, Manager**

TELEPHONE REPAIR CO.

ROGERS PARK STATION **CHICAGO, ILLINOIS**

STANDARDS TO GO BY



THE STANDARD OF VOLTAGE for the United States is maintained at the National Bureau of Standards by a group of Weston normal saturated cells, which are in effect, small chemical batteries giving a very constant electromotive force, defined by international agreement as 1.018300 volts at 20°C. Temperature changes affect the voltage of these cells, so they are kept in an oil bath, the temperature of which does not vary more than 1/100 degree.

PHOTOGRAPH COURTESY NATIONAL BUREAU OF STANDARDS, WASHINGTON, D. C.

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LET'S GO! U.S.A. KEEP 'EM FLYING!

GO BY STANDARDS

Highlights of the Communications News

Important Communications developments of the past month, briefed for busy readers

by

ROLAND C. DAVIES
Editor, Telecommunications Reports

WITH the developments from the battle fronts 'round the globe, especially the German-Russian battle for the oil wealth of the Caucasus, overshadowing all other affairs, the TELEPHONE ENGINEER'S Washington observer could only view the uncertainties of the war as overbalancing all other weights in the scale of the future so "this and that" event on the Washington scene might be made completely meaningless for the telephone industry in the span of a few weeks or months. In fact, the seriousness of the war—and the Administration's admonition to the American people that the United States might lose it—"blacks out" to a major degree the developments for the telephone industry on the domestic front.

Little can be forecast either for the immediate or the long-range future. The only thing is that the telephone industry is certain to be called upon for greater and closer cohesion and coordination with military operations as the nation now plunges into an actual status of all-out war.

The most significant event on the horizon for the industry is the end of the "long trail" of determining what skilled and technical workers in the telephone operating and manufacturing industries should be classified as "essential" and difficult to replace. The industry has been endeavoring for months to have such a list of "critical occupations" in the telephone operating and manufacturing fields given the stamp of approval by the Federal Government agencies charged with policy-making on this subject.

The War Manpower Commission at last has prepared the "critical occupations" classifications for the entire war effort industrial sphere, including communications as one of the services essential and vital both from military and civilian defense and welfare standpoints. This list of essential employees who are skilled and technically qualified has been formulated after months of study by the Board of War Communications through its Labor-Industry Advisory Committee and its industry numbered committees and by the Selective Service System national headquarters after consultation with the Bell System and U.S. Independent Telephone Association.

Recently the list of occupations was completed in detailed and concrete form by the U. S. Employment Service. The results of the USES study, together with the recommendations of the BWC, are to guide the Selective Service System which will use the list in advising local draft boards on deferments of technicans and skilled workers and also to be the basis for any future move to prevent labor shortages in any region of the country of the different categories of work.

For DRAFT DEFERMENT the key is to be HOW LONG and HOW MUCH training is required for the replacement of the employees listed as essential. For the average—and vast majority—of the employees classed as essential it is anticipated only six months' deferment from draft calls will prevail, but for the highly qualified technical employees, those performing a key role in the continued operation of the telephone service, who have attained such posts or skills so their replacement would take a year or two or longer, draft deferments of a longer duration are believed to be assured. Th War Manpower Commission and Selective Service System, it is authoritatively understood, desire to preserve the "soldiers of the production and essential services front" as far as possible.

Nation's Communications Policies

THE pending Telegraph Merger bill, now being considered by the House Interstate Commerce Subcommittee with only provision for the consolidation of the two domestic wire telegraph systems of Western Union and Postal Telegraph, has precipitated a clash of views among the leading Government agencies charged with communications matters on the issue of whether similar legislative permission should be included in the Congressional measure to allow the international cable and radiotelegraph companies to merge with the anti-trust law being waived. This controversy holds considerable significance for the telephone industry.

While shrouded with almost complete secrecy, the contest has lined up FCC Chairman James Lawrence Fly who wants immediate legislation for the international merger against the Army and Navy—and particularly the latter—with the two armed services desiring to have the question deferred until after the war. The State Departmnt is felt to hold the balance of power. The Army and Navy went on record against consideration of the international telegraph merger subject by by legislative act through a policy promulgated early in July by the Joint Army-Navy Board.

FCC Chairman Fly threw down the gauntlet to the Army and Navy by transmitting two letters—one as head of the Commission and the other as chief of the Board of War Communications although the Board membership itself had not approved the document—to the House Interstate Commerce Subcommittee advocating immediate enactment of the international merger legislation by its reinstatement in the Western Union-Postal Telegraph merger bill passed by the Senate. The FCC chieftain revealed that the State Department had sent President Roosevelt a memorandum giving its views on the subject, although it later was disclosed this step was one of great secrecy. Because the letters of Chairman Fly to the House body also cited that the Army and Navy members of the BWC—Major General Dawson Olmstead, Chief Signal Officer of the Army, and Captain Joseph R. Redman, Director of Naval Communications favored his policy of immediate legislation rather than the viewpoint of their Departments, it is known that the Army and Navy BWC members clashed with Mr. Fly on that score at recent BWC meetings.

What the outcome of the clash of viewpoints will be cannot be forecast at this writing. But as a most interesting aspect it has revived the thought —although still in a rumor stage— that the FCC might be deposed from

the leadership of the Board and another one of the five departments on the BWC (which includes the Army, Navy, State, Treasury Departments and FCC) might be designated to head the communications war planning agency. It is reported that the State Department BWC member might be designated. However, there was NO confirmation that this idea had reached any more than a "talk" stage and it may never come to pass.

But it may be recalled that prior to the outbreak of the war in Europe in September, 1939, the Army and Navy branches concerned with communications had proposed the creation of such a Board as the BWC. At that time it is authoritatively understood that the Army-Navy plan was to have only a three-department agency with the State, War and Navy Departments as members. Therefore such an idea as now rumored has ample historical foundation.

Government Orders L-50

THE telephone industry, because of its essential service importance to the Nation in the war effort and civilian defense, is being given practical and tangible consideration in its problems of securing the critical and strategic metals and materials for the maintenance of its systems and service even though the present situation of such metals and materials is so markedly short to carry on the sorely needed war production activties. This weighing of the telephone service's importance in the proper light is due largely to careful and thoughtful planning of the WPB Communications Branch, headed by Leighton H. Peebles, and with its Telephone Section in charge of Bruce H. McCurdy.

The L-50 Telephone Limitation Order has been refined and made more practical and flexible through a revision by the WPB Communications Branch which has incorporated the various amendments that had been issued by the WPB since the original order. In addition to the inclusion of the amendments, a number of the phases of the L-50 restrictions, which had proved difficult of usage by the telephone companies and which were brought out in the Communications Branch's question-and-answer interpretative exposition of the Order, have been written into the new revised L-50 mandate. It was explained by WPB officials that the new L-50 revisions in no way lightened the limitations upon telephone service—in fact they are tightened in some instances—but made them more operable. **Incidentally, telephone companies must be ON GUARD all the time to prevent any violations or stepping out of line on the L-50 restrictions, whether wilful or unintentional, because the WPB is now entering into a period when compliance with its orders is to be enforced with the sternest force and remedies possible.**

Convention Dates

United States Independent Telephone Association, Sherman Hotel, Chicago, October 15, 16.

South Dakota Telephone Association, Hotel Widman, Mitchell, Oct. 28.

Oklahoma Telephone Association, Mayo Hotel, Tulsa, Nov. 12 and 13.

Alabama Independent Telephone Association, Jefferson Davis Hotel, Montgomery, Nov. 12 and 13.

Missouri Telephone Assoc., Muehlebach Hotel, Kansas City, Nov. 16, 17 and 18.

P-129 and P-130

Another important revision of the WPB orders for the telephone industry is the combination of the maintenance and repair provisions for telephone service in the "operating construction" preference order—P-130. It is anticipated that this will lighten the load of telephone companies considerably in their reports to the WPB and was a logical step. The telegraph and radio-communications industries are to have separate maintenance-repair-operating construction orders, instead of the present status of telephone and these other forms of communications being combined under a single maintenance-repair order P-129 as at present. (See complete revision orders in this issue).

Convention Announcement

Announcement has just been made by the United States Independent Telephone Association that the Hotel Sherman, Chicago, has been selected to serve as headquarters for the annual convention October 15 and 16. This should be marked on your calendar as the convention was originally scheduled for the Hotel Stevens in Chicago which has now been taken over by the U. S. Army.

The annual convention for this year will be a streamlined affair for two days instead of the usual four days and no manufacturers exhibits will be shown. We suggest your immediate reservation for your accommodations at the Hotel Sherman.

Copper

TO AID the telephone companies, along with other communications services, the WPB July 28 increased the copper priority rating for telephone maintenance-repair-operating construction from A-3 to A-1-j. This was necessitated by the earlier Copper Conservation Order M-9-c which had placed a restriction on copper supplies for any purpose unless it had a rating of A-1-k or better. The A-3 rating, however, applies to all other metals and materials for the telephone industry for the P-129 and P-130 Orders.

Exemption from L-41

The WPB has also exempted construction of telephone facilities from having to pass through the machinery of its General Construction Limitation Order L-41 so that instead of having to dispatch duplicate applications for facilities construction, one under L-50 and the other under L-41 (although both have been handled simultaneously by the WPB Communications Branch), telephone companies now have only to comply with L-50. Construction of buildings which had to be rebuilt because of fires, tornadoes, hurricanes, etc. would also be permitted under a liberalization of the L-41 mandate.

During the five months that the L-50 order has been in effect there have been accomplished most substantial savings in the use of strategic metals and materials by the telephone industry. At the same time, it is felt that there has been relatively little interruption of normal civilian usage of telephone facilities as a result of the L-50 restrictions.

To illustrate the savings in critical metals it was pointed out that the Bell System and Western Electric in 1942 used less than one-third of the copper tonnage than in the preceding year. During the period of large telephone construction from 1926-1931 the annual use of copper averaged 96,000 tons, but from 1926-1941, which included the depression years, the average copper usage was 55,000 tons per year. The 1942 consumption of copper in telephone construction is estimated to be less than one-half of the 1926-1941 annual use.

Similarly there have been very ma-

(Please turn to page 54)

Text of

PRIORITY AMENDMENTS

Orders P-129 and P-130

HIGHER preference rating to enable communications companies to obtain copper necessary for operating construction, maintenance and repair were granted today by the Director General for Operations.

The action was taken in amendments to Orders P-129 and P-130.

P-129 raises the rating for telephone, telegraph, cable and radio companies for copper from A-3 to A-1-j. Copper order M-9-a restricts deliveries of copper to A-1-k or higher and today's action enables these communications companies to obtain materials in conformity with that order.

P-130 gives a similar rating for deliveries of copper necessary for operating construction by telephone companies, such as connection of subscribers, changes in central office equipment, and the like.

The A-3 rating continues in effect for supplies other than copper.

TITLE 32—NATIONAL DEFENSE
Chapter IX—War Production Board
Subchapter B—Director General for Operations
Part 1095—Communications Maintenance, Repair and Operating Supplies
[Preference Rating Order P-129— as Amended July 28, 1942]

Section 1095.2 *Preference Rating Order P-129* is hereby amended to read as follows:

§ 1095.2 *Preference Rating Order P-129*—(a) *Definitions.* For the purpose of this order:

(1) "Operator" means any individual, partnership, association, business trust, corporation, receiver or any form of enterprise whatsoever, whether incorporated or not, the United States, the District of Columbia, any state or territory of the United States, and any political, corporate, administrative or other division or agency thereof, to the extent engaged in one or more of the following services within, to or from the United States, its territories or possessions:

(i) Wire communication.

(ii) Radio communication.

(2) "Material" means any commodity, equipment, accessory, part, assembly, or product of any kind.

(3) "Maintenance" means the upkeep of an operator's property and equipment in sound working condition; and this without regard to whether or not the expenditures therefor are for any reason required to be recorded in the operator's accounting records in accounts other than maintenance and repair.

(4) "Repair" means the restoration without thereby increasing existing facilities, of an operator's property and equipment which has been rendered unsafe or unfit for service by wear and tear, damage, destruction of parts, or similar cause; and this without regard to whether or not the expenditures therefor are for any reason required to be recorded in the operator's accounting records in accounts other than maintenance and repair.

(5) "Operating supplies" means any material which is essential to and consumed in the operation of any of the services specified in (a) (1) above but does not include any material which is physically incorporated in whole or in part in the property or equipment of the services specified above.

(6) Material for mainteance, repair or operating supplies for the purpose of this order shall not include material used for:

(i) The improvement of an operator's property or equipment through the replacement of material which is still usable in the existing property or equipment with material of a better kind, quality or design.

(ii) Additions to or expansions of the operator's existing property or equipment.

(b) *Assignment of preference rating.* Subject to the terms of this order, Preference Rating A-3, except as provided in subparagraph (2), is hereby assigned:

(1) To deliveries, to an operator, of material required by him for operating supplies or for maintenance or repair of his property and equipment.

(2) Preference Rating A-1-j is hereby assigned to all items required by an operator under the provisions of subparagraph (1) above containing copper and copper alloy.

(c) *Application and extension of rating.* The rating assigned by paragraph (b) of this order shall be applied and extended in accordance with Priorities Regulations Numbers 1 and 3, as amended from time to time.

(d) *Restrictions on deliveries, inventory and use.* (1) On and after September 1, 1942, except as provided in paragraph (d) (3) below, no operator, who has applied the rating assigned hereby, shall at any time, accept deliveries of material (whether or not rated pursuant to this order) to be used for maintenance, repair, operating supplies or for other purposes:

(i) Until the dollar value of the operator's inventory of material shall have been reduced to a practical working minimum. Such practical working minimum shall in no event exceed 27½% of the dollar value of material used for all purposes during the calendar year 1940.

(ii) Where the receipt thereof shall increase the dollar value of operator's inventory of material to an amount in excess of normal requirements which in no event shall exceed 27½% of the dollar value of material used for all purposes during the calendar year 1940.

(2) Except as provided in paragraph (d) (3) below, no operator who has applied the rating assigned hereby shall, during any calendar quarterly period, use material for maintenance, repair, and operating supplies, the aggregate dollar value of which shall exceed 110% of the aggregate dollar value of such material used during the corresponding quarter of 1940, or at the operator's option 27½% of the aggregate dollar value of such material used during the calendar year 1940.

(3) (i) Any operator whose average value of inventory of material for the five calendar years prior to January 1, 1942, did not exceed $10,000 shall be exempt from the provisions of subparagraph (1) above.

(ii) Frm time to time, the Director General for Operations may determine that certain operators are exempt in whole or in part from the restrictions contained in subparagraphs (1) and (2) above.

(e) *Violations.* Any operator or other person who applies the preference rating assigned hereby in wilful violation of the terms and provisions of this order or who wilfully falsifies any records which he is required to keep by this order, or who in connection with this order wilfully conceals a material fact or furnishes false information to any department or agency of the United States, or who obtains a delivery of material by means of a material and wilful misstatement, is guilty of a crime, and upon conviction may be punished by fine or imprisonment. In addition, any such operator or other person may

be prohibited from making and obtaining further deliveries of material under allocation and/or priority control and be deprived of any other priorities assistance.

(f) *Effective date.* This order shall take effect on the date of issuance and shall continue in effect until September 30, 1942, unless sooner revoked by the Director General for Operations. (P.D. Reg. 1, as amended, 6 F.R. 6680; W.P.B. Reg. 1, 7 F.R. 561; E. O. 9024, 7 F.R. 329; E.O. 9040, 7 F.R. 527; E.O. 9125, 7 F.R. 2719, sec. 2 (a), Pub. Law 671, 76th Cong., as amended by Pub. Laws 89 and 507, 77th Cong.)

Issued this 28th day of July 1942.

AMORY HOUGHTON,
Director General for Operations.

TITLE 32—NATIONAL DEFENSE
Chapter IX—War Production Board
Subchapter B—Director General for Operations
Part 1095—Communications Operating Construction
[Preference Rating Order P-130, as Amended July 28, 1942]

Section 1095.3 *Preference Rating Order P-130* is hereby amended to read as follows:

§ 1095.3 *Preference Rating Order P-130*—(a) *Definitions.* For the purposes of this order:

(1) "Operator" means any individual, partnership, association, business trust, corporation, receiver, or any form of enterprise whatsoever, whether incorporated or not, the United States, the District of Columbia, any state or territory of the United States and any political, corporate, admintsrative or other division of agency thereof, to the extent engaged in telephone communication within, to or from the United States, its territories or possessions.

(2) "Material" means any commodity, equipment, accessory, part, assembly, or product of any kind.

(3) "Operating construction" means:

(i) The use of materials for normal construction occasioned by the connection, disconnection, changes, in or relocation of subscribers' apparatus or other equipment, necessary in order to provide service. In no single case, however, shall the cost of material for such operating construction exceed fifty dollars ($50.00);

(ii) The relocation or installation of central office equipment as a part of the common switching and/or trunking facilities to meet traffic requirements and provide the necessary channels through which the existing traffic load may be trunked and connections established to enable full use to be made of the existing line terminals but not including the addition of line terminals;

(iii) Rearrangements or changes in existing line plant in order to obtain a more effective or fuller use of such plant: *Provided, however,* That no line capacity shall be added thereto; and

(iv) Short cable extensions of line plant from a given point which do not involve the use of more than 100 pounds of copper and which make available for more effective use existing exchange plant not otherwise usable.

(b) *Assignment of preference rating.* Subject to the terms of this order, Preference Rating A-3, except as provided in subparagraph (2), is hereby assigned:

(1) To deliveries, to an operator of material required by him for operating construction;

(2) Preference Rating A-1-j is hereby assigned to all items required by an Operator under the provisions of subparagraph (1) above, containing copper or copper alloy.

(c) *Application and extension of rating.* This rating assigned by paragraph (b) of this order shall be applied and extended in accordance with Priorities Regulations Numbers 1 and 3, as amended from time to time.

(d) *Restrictions on application of rating.* (1) No operator may apply the rating hereby assigned until he has determined, as to the Material or Materials sought for operating construction:

(i) That a less scarce material or materials cannot be substituted without serious loss of efficiency;

(ii) That a smaller quantity thereof will not satisfy the use intended; and

(iii) That the construction contemplated may not be postponed or deferred to a later date.

(2) No operator shall so divide a single order, job or project to qualify the same under the terms of this order.

(e) *Restrictions on deliveries, inventory and withdrawals.* (1) On and after September 1, 1942, except as provided in paragraph (e) (3) below, no operator, who has applied the rating assigned hereby, shall, at any time, accept deliveries of Material (whether or not rated pursuant to this order) to be used for any purpose:

(i) Until the dollar value of the operator's inventory of material shall have been reduced to a practical working minimum. Such practical working minimum shall in no event exceed 27½% of the dollar value of material used for all purposes during the calendar year 1940.

(ii) Where the receipt thereof shall increase the dollar value of the operator's inventory, of material, to an amount in excess of normal requirements which in no event shall exceed 27½% of the dollar value of material used for all purposes during the calendar year 1940.

"Pappy, what is car pooling?"

(Please turn to page 45)

Wire Chief's TRAINING COURSE

Subject: *Cable Splicing*

SECTION XVII

(Prepared Expressly for TELEPHONE ENGINEER by the Lincoln Engineering School)

Wrapping Up Splice

AFTER the cable conductors have been thoroughly boiled out as explained in the last lesson the splice should be carefully wrapped using muslin tape applied in two layers placed in a reverse direction. The core should be wrapped fairly tight so that the lead sleeve will easily slip in place. The muslin tape should be tied by slipping under the last turn as shown by Figure 1.

After the splice is wrapped hot paraffin should be poured over the tape so that it is thoroughly impregnated.

Placing and Wiping Sleeves

AFTER the cable core has been wrapped, the sleeve which has previously been placed over the cable before splicing should be slipped into place and arranged so that it projects the same distance on each side of the splice. Using cable dresser beat the ends of the sleeve down against the cable as shown in Figure 2. This operation should be carefully executed so as to insure that the sleeve is properly centered, and that the ends are down tightly around the cable. The ends of the sleeve should be scraped and stearine applied before the sleeve is placed. Apply paper cable stickers around the cable and the lead sleeve to limit the size of the wiped joint, as shown in Figure 3.

The actual space allowed for the joint will depend upon the sleeve size. For sleeves smaller than 4" the joints should be approximately 2" wide.

The joint is now ready for wiping. The wiping solder should consist of a mixture of 60% lead and 40% tin.

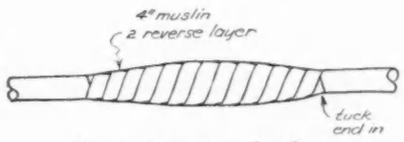


Fig. 1—Wrapping the Core.

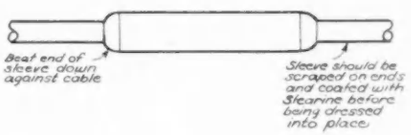

Beat end of sleeve down against cable
Sleeve should be scraped on ends and coated with Stearine before being dressed into place

Fig. 2—Preparation of Sleeve for Wiping.

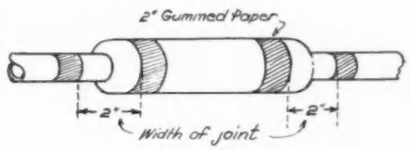


Fig. 3—Application of Cable Pasters before Wiping

The more lead the mixture contains the more porous will be the joint. The solder is heated in a small metal pot on a plumber's furnace. Solder should be added to the pot until it is about ¾ths full when molten. To determine the correct temperature of the solder a special cable splicer's thermometer should be used. It is quite important that the solder be at the correct temperature as solder which is too cold will result in a porous joint and if too hot it may melt the sleeve of the cable sheath.

Old time splicers can tell fairly accurately whether the temperature is correct by simply observing the color of the solder. Another practical test is to dip a piece of paper into the molten solder and if the solder is at the right temperature, the paper will scorch a dark brown. If the paper ignites the solder is too hot.

The scum or dross which gathers on the surface of the molten metal should be removed by skimming with a solder ladle. When the solder reaches the proper temperature the cable splicer's helper should place it on the hand line hook and pass it up to the cable splicer on the platform. Care should be taken in handling molten solder as serious accidents may result if thru carelessness the solder pot is overturned or dropped. In pulling the solder pot up to the platform, the helper

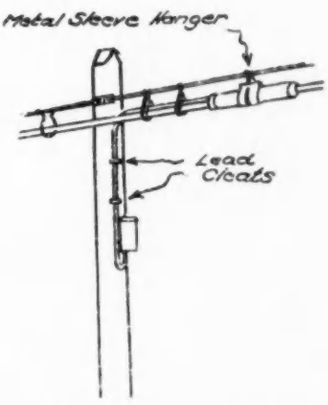


Fig. 4—Well Made Vertical Splice.

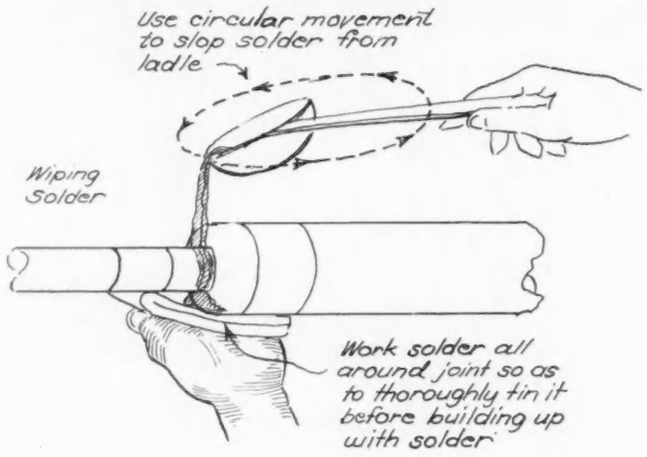

Use circular movement to slop solder from ladle
Wiping Solder
Work solder all around joint so as to thoroughly tin it before building up with solder

Fig. 5—Wiping the Joint.

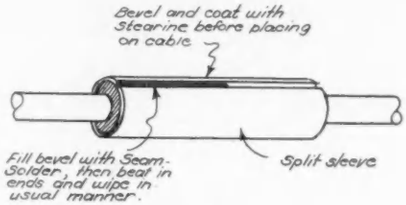

Bevel and coat with Stearine before placing on cable
Fill bevel with Seam-Solder, then beat in ends and wipe in usual manner.
Split sleeve

Fig. 7—The Split-Sleeve.

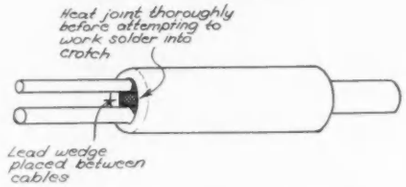


Fig. 8 — General Features of "Y" Type Joint.

should stand as far back from the pot as practicable. The ladle should always be removed from the pot before it is passed up to the splicer.

Wiping the Lead Joint

A SHALLOW drip pan should be placed on the platform below the splice and with a catch pad held below the joint, several ladles of solder should be poured over the joint and caught with the pad below. This solder should be worked back and forth across the bottom and up the sides of the joint so as to thoroughly tin the end of the sleeve and cable itself. After the joint is thoroughly tinned, solder should be poured over the joint and worked back and forth with the wiping pad until the joint is built up to the proper thickness and shape.

In pouring solder over the joint, most cable splicers give the ladle a sort of a circular motion with the wrist so as to "slop" a small amount of the molten solder out of the ladle at a time. By this means it is easier to control the solder. After the joint has been "roughed" in with the catch cloth, it should be smoothed out with a small preformed finishing pad. Fig. 5 illustrates these several steps. The cable pasters can then be removed and if the joint is somewhat rough it can be smoothed out by the judicious use of a blow torch passed back and forth across the joint, being careful not to overheat it. Care should be taken to avoid wiping a joint with solder which is not at the proper temperature as the joint may be porous and will permit moisture to enter the sleeve. After the joint is completed the cable rings on each side of the sleeve should be adjusted so as to properly support the sleeve and a special cable support strap placed at the middle of the sleeve so as to attach it rigidly to the messenger. Figure 6 illustrates how sleeves should be supported where they are in rings.

Placing Split Sleeves

WHERE splicing work is done on existing cable or where a terminal is cut into a new cable it is often necessary to use a **split sleeve.** A split sleeve consists of an ordinary sleeve which has been split longitudinally with a cableman's saw. After the sleeve has been split it should be beveled along the cut so as to facilitate soldering. The

(Please turn to page 51)

Fig. 6—Use of Special Sleeve Support.

FIG A: CONDUCTORS READY FOR SPLICING

Fig. 9—The Bridge Type Splice.

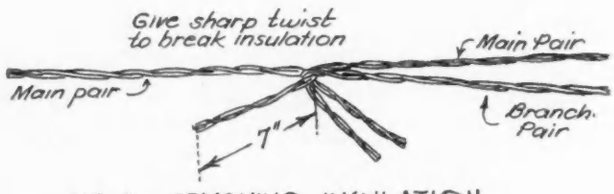


FIG. B: REMOVING INSULATION

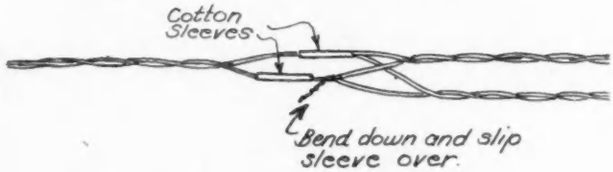


FIG C: FINISHING SPLICE

Design Features of Audio Amplifier Circuits

by

C. F. PETERSON

General

DUE to the use of audio amplifiers in various circuit applications in the telephone field, some information on the design features of several modern audio amplifier circuits may be of interest. The function of the various coupling condensers, by-pass condensers, and bias resistors, etc. is fully explained. The circuits shown are modern and up-to-date but the power supply system is omitted from most of the circuits shown as power supply systems are all very much the same. Any of the circuits shown, when combined with a suitable power supply can be expected to give good results. In selecting or designing a power supply unit to use with a given amplifier, it should be kept in mind that a power system must be capable of delivering adequate current at the correct voltage.

Amplifier Terminology

IN discussing practical audio amplifiers a number of terms and phrases descriptive of the various phases of this subject must necessarily be used. To insure that the reader will be familiar and acquainted with these terms, there are listed below the more common terms and phrases and an explanation of each.

Grid Bias—This refers to the negative D. C. voltage placed on the control grid of an audio amplifier tube in order to fix its **operating point** over a specific part of its characteristic curve.

Input Signal—A phrase often used which means the audio source voltage which is to be amplified and which is applied to the input circuit of the amplifier.

Operating Point—The point on the grid voltage plate current curve which is fixed by the negative grid bias voltage. For example if a tube carries a 10 volt bias, we could say the operating point is 10 volts.

Grid Swing—The phrase "swinging the grid," or "grid swing" means the amount of signal voltage applied to the grid of a vacuum tube. For example, instead of saying that the input signal is 5 volts, we might say our grid swing is 5 volts.

R.M.S. and Peak Values—Most A.C. voltmeters read **effective** or **root mean square** values of an A.C. wave. In audio amplifier work in considering the grid swing we are usually more interested in the **peak values** of an A.C. wave. We must therefore be careful in speaking of voltages to specify whether we mean R.M.S. or peak values. For example if we measure our input signal and find it reads 5.0 volts on a voltmeter and if we wish to specify what the grid swing is we should best convert the R.M.S. reading to peak

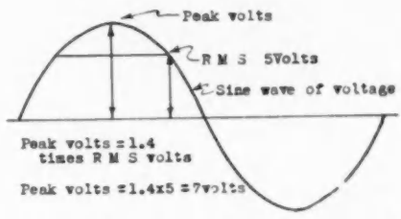


Fig. 1—Relationship between R. M. S. and Peak Values of Wave

reading. This is done by multiplying the R.M.S. value by 1.4. In other words our peak grid swing would be 5x1.4 or 7 volts. (See Fig. 1)

Impedance Matching—In audio amplifier work reference is frequently made to **impedance matching.** This is a very important phase of audio work and should be well understood. For the purpose of definition let us say that impedance matching involves the selection of a load impedance that will equal the source impedance. For example if we have a power tube in the output circuit of an audio amplifier and the plate impedance of the tube is 10,000 ohms then if we are to get the maximum possible power from the tube into the loudspeaker (the load) it should have the same impedance as the tube. As the impedance of the load is generally different from that of the source a transformer must be used to match the source to load impedance. If we have a 10,000 ohm load and a 100 ohm source then we will need a transformer whose impedance ratio is 100 to 1.0.

Class A Amplifier—This is defined as an amplifier having a negative grid bias of such value that the signal voltage never swings the grid into the positive region and one in which plate current flows throughout the cycle. Features of the class A audio amplifier is the fact that little or no power (only voltage) is required to swing the grids, and it offers less distortion than the other types of amplifiers.

Class B Amplifier—A class B audio amplifier is one in which the grid is biased so that little or no plate cur-

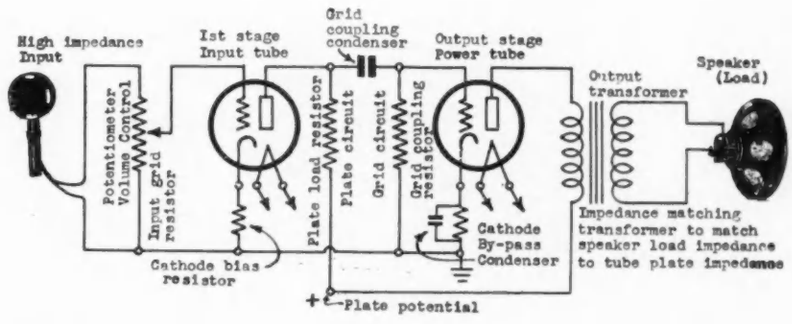


Fig. 2—Illustration showing significance of the various terms used in Audio Amplifier work.

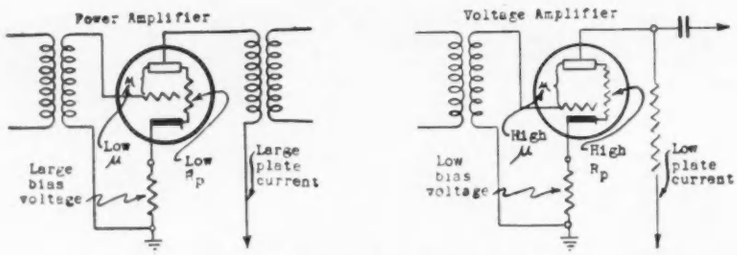


Fig. 3. Essential Difference between Voltage and Power Audio Stages

rent flows during the **no-signal condition,** and so that plate current flows for approximately one one-half of the input cycle when the signal is applied.

Class B audio amplifiers will in general have more distortion (unless carefully designed and operated) than class A, and they require the use of two tubes arranged in a push push circuit. A class A amplifier can use a single tube if desired. The class B amplifier, however, is much more efficient than class A and permits high audio power output from relatively cheap tubes.

Plate Resistance—This term refers to the resistance which acts in series with the output voltage of the tube. A tube with a plate resistance of 5000 ohms and capable of delivering an output voltage swing of 200 volts, would be comparable with an A.C. generator whose internal impedance is 5000 ohms and output voltage 200 volts.

In dealing with audio amplifiers we must know the plate resistance (sometimes called impedance) of a tube if we are to match it to the load impedance into which it will work. In voltage amplifiers we try to make our load impedance as high as possible. In power output stages (class A) we try usually to make our load impedance about twice as high in order to get **maximum undistorted** output from the tube. **Maximum output** is obtained when the load impedance is equal to the plate impedance.

Amplification factor—This is defined as the ratio of the change in plate voltage to the change in control grid voltage to produce the same change in plate current. From the amplification factor of a tube we are able to compute the gain supplied by an amplifier.

Inverse Feedback—This refers to an arrangement whereby energy is fed from the plate circuit of an audio tube back to the grid circuit so as to partially oppose or buck the signal voltage. This greatly improves the quality and stability of an audio amplifier.

Power Output—Vacuum tubes that are designed to furnish power to a load are rated by their manufacturer in terms of their power output in watts. This refers to the actual power they are capable of supplying to the load, when driven to their maximum grid swing. Certain tubes such as high resistance triodes or pentodes are not rated as to power output inasmuch as these tubes are used only for voltage amplification purposes and are not capable of delivering any appreciable power to the load due to their high plate resistance.

Driver Stage—The power output stage of an audio amplifier must deliver electrical power to the load. It is essentially a low impedance stage and as a result the grid input of a power stage usually requires a small amount of power, which is supplied by the **driver stage.** The driver stage, which immediately precedes the power stage, has characteristics intermediate between a voltage amplifier and a power amplifier; that is it provides a considerable amount of voltage amplification, but at the same time supplies the small amount of power necessary to drive the grid of the power amplifier.

Drive the Grids—In the normal connection of a vacuum tube in an amplifier circuit, the grid of the tube is supplied with some value of fixed negative bias voltage, which fixes the operating point and determines the steady no-signal value of D.C. plate current. When a signal is applied to the grid of the vacuum tube, the signal increases the negative bias beyond the fixed value on the negative half cycle, and decreases the bias below the fixed value on the positive half cycle. Thus the signal "drives" the grid voltage above and below the normal bias value; and this process is known as "driving the grid."

Source Impedance—Every source of voltage, whether it be a microphone, generator or battery, has an internal impedance. For example, a dynamic microphone has an internal impedance composed of the resistance of the voice coil as well as the inductance of this coil. The impedance of a voltage source such as a microphone determines the current, and consequently the voltage which the microphone will develop with a given sound striking the diaphragm; and since this voltage is very small at best, the impedance of this source must be carefully matched to the amplifier input to obtain the greatest power transfer. Some input sources, such as the carbon and dyn-

"The Young Lady said I should hold the 'phone"

(Please turn to page 47)

Personals from the Field

John P. Boylan, president of the Rochester (N. Y.) Telephone Company celebrated his completion of 50 years with the telephone industry on July 1.

•

Charlie Clark, A. B. Chance Co. Chicago representative, was featured in a recent issue of that Company's "Chance Tips."

•

Arch Mac Kinnon, executive secretary of the New York State Telephone Association, paid an unusual tribute to the retiring officers, **Lloyd C. Wright, Harold White, Clifford Sayers** and **A. P. Holmberg** in their Association Bulletin #7. It is the best tribute we have seen in written form, on the unstinting service these men have given to their New York Association.

•

R. B. Fegan, of Junction City, Kan. has resigned as a director of United Utilities, Inc., as well as from its three subsidiary companies, American Telephone Co., United Telephone Co. of Missouri, and United Telephone and Telegraph Co. Mr. Fegan stated he was resigning to give all of his time to his own company, the Junction City Telephone Company.

•

Sale of the Christian County Telephone Company at Ozark, Mo. to **J. M. Havin,** formerly of Kirkwood, Mo., became effective July 1. He has been connected with the telephone business in and around St. Louis county for over 35 years.

•

Delegates representing 5,100 Rotary clubs in some 50 countries of the world, at the final session of the 33rd annual convention of Rotary International, at Toronto, Can., have elected **Don Fernando Carbajal** of Lima, Peru, Rotary president for the year beginning July 1. **Mr. Carbajal** is vice-president of the Peruvian Telephone Company in Lima and is former State Engineer of Peru.

•

The Mullinville (Kans.) Telephone Exchange passed into the hands of **G. M. Porter** yesterday and **Mr. and Mrs. H. H. Brown** are retiring from this business after twelve years of service.

CAPTAIN GEORGE S. BLAKE

Captain George S. Blake, 217th Signal Supply Depot, Camp Crowder, Mo., and formerly with the Associated Telephone Co., Ltd., of Santa Monica, Calif., is now in active service at the above address. George is well known to all Independents and was one of the Californians responsible in establishing a chapter of the Independent Telephone Pioneers Association in California. Those of you who want to drop him a note will find a welcome response.

•

The FCC suffered its first war casualty when **Captain Harold Smith** of the Army Air Corps and former Telephone Rates Examiner at the Commission, was killed July 24 in an airplane crash near Lynchburg, Pa. A high-ranking graduate of Pennsylvania State College and the George Washington University Law School, Captain Smith was admitted to the D. C. Bar in 1939. He was with the FCC from 1938 to September, 1941, when he was called into active army service.

•

Robert C. McCann, who has been vice president and general manager of the Chesapeake and Potomac Telephone Co. of Virginia since 1939, was elected Aug. 4 vice president of the four C. & P. companies of Washington, Baltimore City, Virginia and West Virginia to coordinate their construction, maintenance and other expense factors.

F. K. Cannon, former export manager of the Stromberg-Carlson Telephone Manufacturing Co., died suddenly on July 23. For the past eight years he was general manager of the West Coast branch of the Company in San Francisco and while serving in this capacity travelled widely in Europe and South America. He is survived by his widow and two daughters.

•

Henry Thompson is the new general manager of the Midwest Telephone and Utilities Co. and the Associated Telephone and Utilities Co. of Petersburg, Indiana. He is from Iowa and succeeds **A. L. Greenman,** retired.

•

Oscar Burton, vice president and general manager of the Gulf States Telephone Co., Tyler Texas, is doing his job for our war efforts. He is on his County Rationing Board, Regional Chairman of the U.S.O. Drive and serves on the Statewide Salvage Committee. This coupled with his many other usual civic duties should make him eligible for a "new tire."

•

Demot K. Foley of San Francisco sends us a clipping from the San Francisco Examiner of July 15. It illustrates a scene at the Victory Ball given by the Bell club, a social organization of the Pacific Tel. and Tel. Co. to raise funds for the entertainment of service men. This is a grand idea!

•

Earl and **Edith Ewer** are the new owners of the telephone exchange at Buffalo, Mo. The sale was approved by the Commission on July 31st after application to sell had been made by Missouri Standard Telephone Co.

•

R. L. King is now owner of the Arkansas Valley Telephone Co. serving Mulvane and Udall, Kansas. He purchased the system from **Mrs. Thelma Kelly** and **Mrs. Irene Cales.**

•

Clarence Smith is the new manager of the Highland, Kansas, Exchange replacing **Galen Hay.**

•

B. B. Buchanan is the applicant to purchase the Philadelphia (Mo.) telephone exchange in a joint application filed with the Missouri Commission on July 29th. **B. C. Humphrey** is the seller.

•

The **Durand (Ill.) Exchange** of the **Wimmebago Telephone Co.** has been

(Please turn to page 50)

THUMBNAIL DISCUSSIONS

Wartime Maintenance

By JAY G. MITCHELL

Novel Outlook

BECAUSE the telephone is the one method of quick communication available to all without special training and due to its widespread connections into every town, cross roads hamlet and village in the entire country the responsibility of the management is definitely increased under existing conditions. In ordinary times the extension of the service by the connection of new subscribers is a very large part of the task of the management. Under the conditions existing this spring every effort should be made to eliminate any and all potential causes of service failure at the unknown future crucial moment. Conditions in the plant which could be tolerated with equinamity last year must be instantly and definitely placed in the class where no failure of the service is possible. This cannot be given too much emphasis. Communication from the most remote and isolated telephone to the central office must be rendered sure and certain just as far as that result may be possible.

Rural Switching Subscribers

THE foremost plant activity that may be carried out in many telephone systems is the presentation of this prime objective to the switching rural subscribers. It is recommended that a canvass of all such subscribers be made at once and that their attention to the condition of all equipment and plant under their jurisdiction be requested. Such a canvass can be made by telephone in most cases. Obviously rural switching subscribers who cannot be reached by telephone from the central office or who cannot be heard when they have been reached are proper subjects for personal calls. A little intensive work from the central office by a diplomatic and patient employee along this line will produce results when the matter is presented as an important and patriotic contribution to the war effort the whole country is putting forth. Why is the importance of canvassing the condition of the rural switching telephone plant given such prime emphasis? It is because such plant, in some localities, is not systematically maintained and is, as a natural result, very likely to develope some spotty and unreliable service capacities. Now it can never be foreseen when the rural telephone plant may be called upon for the transmission of some message under conditions such as to render failure of any kind disastrous. For that reason the suggestion is made that the switching service rural plant be given such attention as may be possible. It is suggested that the work be done by an employee in the central office who is acquainted with the relations between the switching subscribers and the company because such an employee, with tact and patience, can secure the desired result without stirring up resentment.

Rural Plant

NEXT in order for executive attention after the rural switching subscribers are the rural portions of the company owned plant. Spring is the normal time for pulling slack, retensioning guys, resetting poles and anchors and inspection of drops. It is also the normal time for testing batteries and receiver cords in magneto telephones and present conditions call for every kind of attention to the entire plant that will eliminate future trouble and reduce potential failure.

The rural portions of the plant have been mentioned for intensive attention because they are located at points farther from the central office often in remote and more or less inaccessible

MEMO TO EMPLOYEES

Many employees will be tempted by high wages to leave telephone companies.

Before you do, think hard and long.

REMEMBER—

That the high wages will be temporary.

You will work hard for them.

You will be a mere cog in a machine.

You will sacrifice all telephone experience and training.

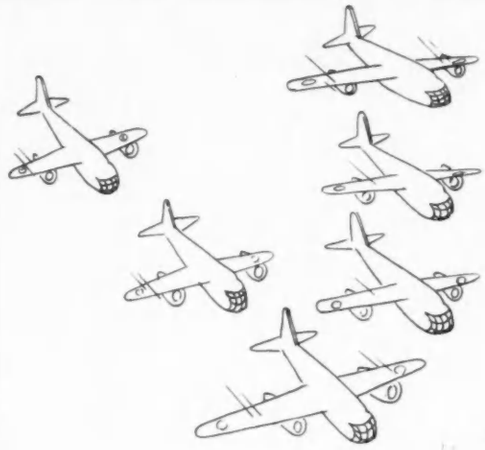
You will miss any chance of promotion.

When the war ends (as it will) you might be an unskilled or a semi-skilled mechanic or machine tender and there will be 10 million others like you.

It will be hard to come back.

That the experience you will have missed in the telephone industry will be indispensable when peace returns to this troubled world.

That you can render the best service to your country by doing your telephone job which you are best fitted to do. It was said in the U. S. Senate that "Adequate communications facilities and the maintenance of a strong, cohesive, and far-flung communications system are as vital to the successful prosecution of the war as is the production of guns, airplanes, tanks and ships."



To "*keep 'em flying*"

and to "*keep 'em rolling*" you must

"KEEP 'EM TALKING"

THAT'S your job . . . "Keep 'Em Talking" . . . and Cook Protection and Distribution equipment, designed, engineered and constructed to meet every demand under every service condition will help you do your job. For camps and cantonments, for defense plant alarm systems and housing projects, Cook equipment offers maximum installation convenience, maximum protection for subscribers, employes and plant, and maximum economy. Put your protection and distribution problems in Cook engineers' hands. Buy Cook equipment from telephone manufacturers and supply houses everywhere.

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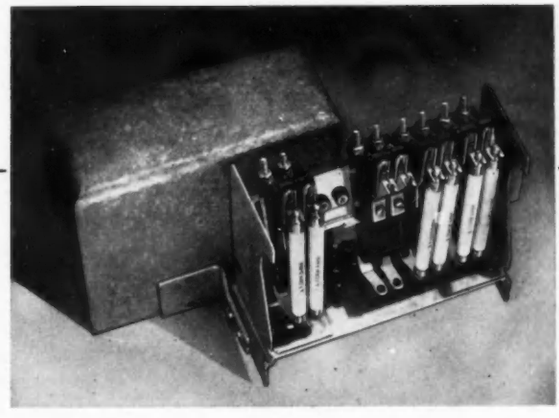


The new Type U Trans-Mount Sub-Station Protector provides protection for open wires up to five pairs per unit at railroad crossings and power line cross overs and parallels, and in P.B.X. systems. Especially valuable for protecting subscribers drops where several instruments are closely grouped. Compact, convenient, easy to install. Sturdy, hot galvanized base fitted with non-corrosive studs for mounting as many as five Trans-Mount Dual Gap Protector Units. Heavy galvanized hood, insulated entrance holes in base; weather and insect proof. Mounting brackets arranged so that base unit may be brought to horizontal position to facilitate wire connections. When connections are competed entire unit is raised and secured in its permanent vertical position.

places. These are the places where the necessity for immediate and dependable telephone service may be looked for under certain circumstances which we are told are not entirely impossible. Attention to the telephone instruments will, moreover, be especially appreciated by the subscribers in this part of the plant.

Toll Plant

THERE is no division of telephone service which is not now most important in the life and preservation of this country. Every telephone station is likely at any time to become the active terminal of a long distance message of the greatest importance. At such times the telephone instrument, the exchange line circuit, the local and toll switchboard equipment are parts of the medium of long distance communication. With these instrumentalities all in prime operating condition failure may easily occur IF the toll line is defective or out of order temporarily. It is because of the great interdependability of the entire telephone system that the toll line, along with all other parts of the plant, must be free of preventable causes of trouble and failure. The usual quibble about whether toll line trouble is in one territory or another should be shelved for the time at least because if the service fails at a critical time it may be disastrous. Toll lines should be more frequently and carefully patrolled and tested than is customary in normal times. Their perfect condition is **imperative.**

Exchange Service

WITH the same general sense of the importance of eliminating all possible causes of failure the maintenance of the exchange service plant will, of course, be entitled to intensive care. Details which could be left unattended to under normal conditions will be cleared up and weak spots will be reinforced. Possible failure under any conceivable conditions will be forestalled to the end that the system of communication throughout the entire country may be dependable and fast. These suggestions are very general, of course, and are intended to point out the possibility of using without hesitation with the other elements the one element in the business of furnishing telephone service which is not under restrictions that is the time of the operating staff.

(END)

E. R. HANNIBAL PASSES

E. R. Hannibal, vice president and General Manager of the West Coast Telephone Company passed away Wednesday evening, August 5th at his home in Palo Alto after a lingering illness.

He was born in Salt Lake City, Utah, June 22, 1889, and graduated in engineering from the University of Utah in 1911. He was first employed in 1910 by the Rocky Mountain Bell Telephone Company as a student engineer and was soon promoted to supervisory duties.

During the world war he served as Captain in the Signal Corps overseas with the 405th Telegraph Battalion, building and maintaining telephone and telegraph plant used by the American Expeditionary Forces. He received a citation from General Pershing for especially meritorious and conspicuous services in the St. Mihiel action.

After the Armistice he returned to the employ of the Mountain States Telephone and Telegraph Company as valuation engineer in charge of the valuation of telephone properties in Utah and Idaho. In 1920 he became General Superintendent of the Interstate Utilities Company at Spokane, Washington operating telephone properties in eastern Washington and northern Idaho.

In January, 1929 he entered the employ of the West Coast Telephone Company as general plant and traffic manager and became vice president and general manager in charge of all operations in 1931.

E. R. Hannibal

Among his fraternal and technical society affiliations there is listed an associate membership in the American Institute of Electrical Engineers, the American Legion, and membership in Phi Delta Theta Fraternity. He was vice president of the United States Independent Telephone Association and has been president of the Washington State Independent Telephone Association for the last ten years. He is a past president of the Everett Kiwanis Club and past county chairman of the American Red Cross Society. He was interested in all civic affairs in general.

He is survived by his widow, Irma Sims Hannibal; a daughter, Irmajean; and two sons, Ray S. and Warren S. Hannibal.

Federal Excise Taxes on Communications Doubled in 1942

Federal excise taxes on communications, according to a report of the Internal Revenue Bureau July 23, covering the fiscal year ending last June 30, showed that 1942 collections of the levy on long distance telephone, telegraph, cable, radio and leased wire services were practically double the returns in 1941.

The levy on telephone, telegrams, radiograms, and leased wires for the month of June this year brought $4,158,960.66 compared with $2,197,218.13 for the same month last year, an increase of $1,961,742.53. Receipts for the year on the same services totalled $48,231,338.63 in comparison with $27,331,113.61 of the previous year. This represented an increase of $20,900,225.02.

The 6% local telephone tax on monthly bills added $3,203,946.70 to the Treasury's coffers this June and since enactment of the tax last October 1 a total of $26,791,432.95 has been collected on this service.

Prominent Telephone Engineer Enlists in U. S. Navy Reserve

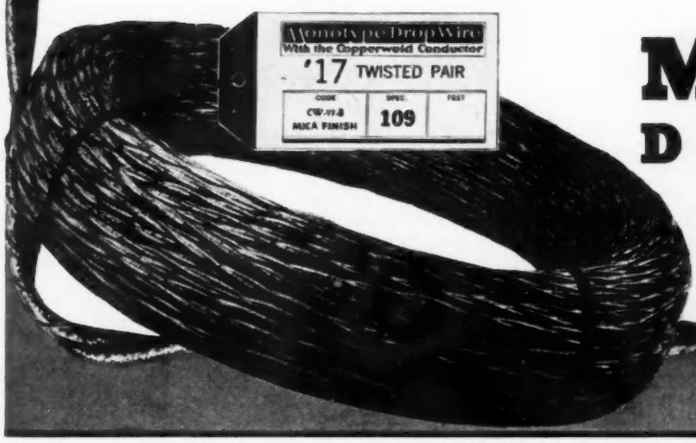
W. H. Morris, well known as a telephone engineer in the industry has been commissioned a full lieutenant in the U. S. Army Reserve. He is now stationed at the naval training station at Cornell University, Ithaca, N. Y.

Lieut. Morris has been associated with J. G. Wray & Co. on the El Paso, Texas, rate case recently however his experience dating back from 1927 includes service with operating telephone companies and as telephone engineer with the West Virginia Public Service Commission and Wisconsin Public Service Commission.

"It's 110° right now!

Good thing for us . . . that sun-resistant rubber compound which came out of General Cable's Research Laboratories! Along with modern pitch-and-mica finish it has made Monotype Drop Wire still better. Years ago, it was the best of its kind—and it's still 'tops' for service drop reliability."

So Says a Telephone Manager



MONOTYPE DROP WIRE

Manufactured by

GENERAL CABLE CORPORATION

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BRANCH WAREHOUSES AT DALLAS, KANSAS CITY, LOS ANGELES, RICHMOND (VA.) AND SAN FRANCISCO

Every time this
An

this dial is turned— America saves production time!

● It used to be said that "Time is money." Today, time may very well mean victory. In every plant and factory throughout the nation, time is being conserved with a grim determination to make every second count—to beat the Axis at its own game of getting there first with the most.

Telephonic communication penetrates to every point in this vast production effort—unifies and coordinates all of these widely separated activities. Everywhere in this network, the lightning-fast, mechanically-accurate service provided by Strowger Automatic equipment shaves seconds and minutes from productive time. It speeds up the interchange of information in hundreds of cities, towns and villages—it steps up efficiency and production in scores of factories, mills and shipyards.

Now, when time has become truly invaluable, Strowger Automatic's contribution of faster service to telephone operation assumes even greater significance. It is but one of those straws of modern American efficiency, which, piled one on the other, will eventually break the camel's back of Axis invincibility.

AUTOMATIC ELECTRIC

ORIGINATORS AND DEVELOPERS OF STROWGER STEP-BY-STEP MACHINE SWITCHING AUTOMATIC DIAL SYSTEMS

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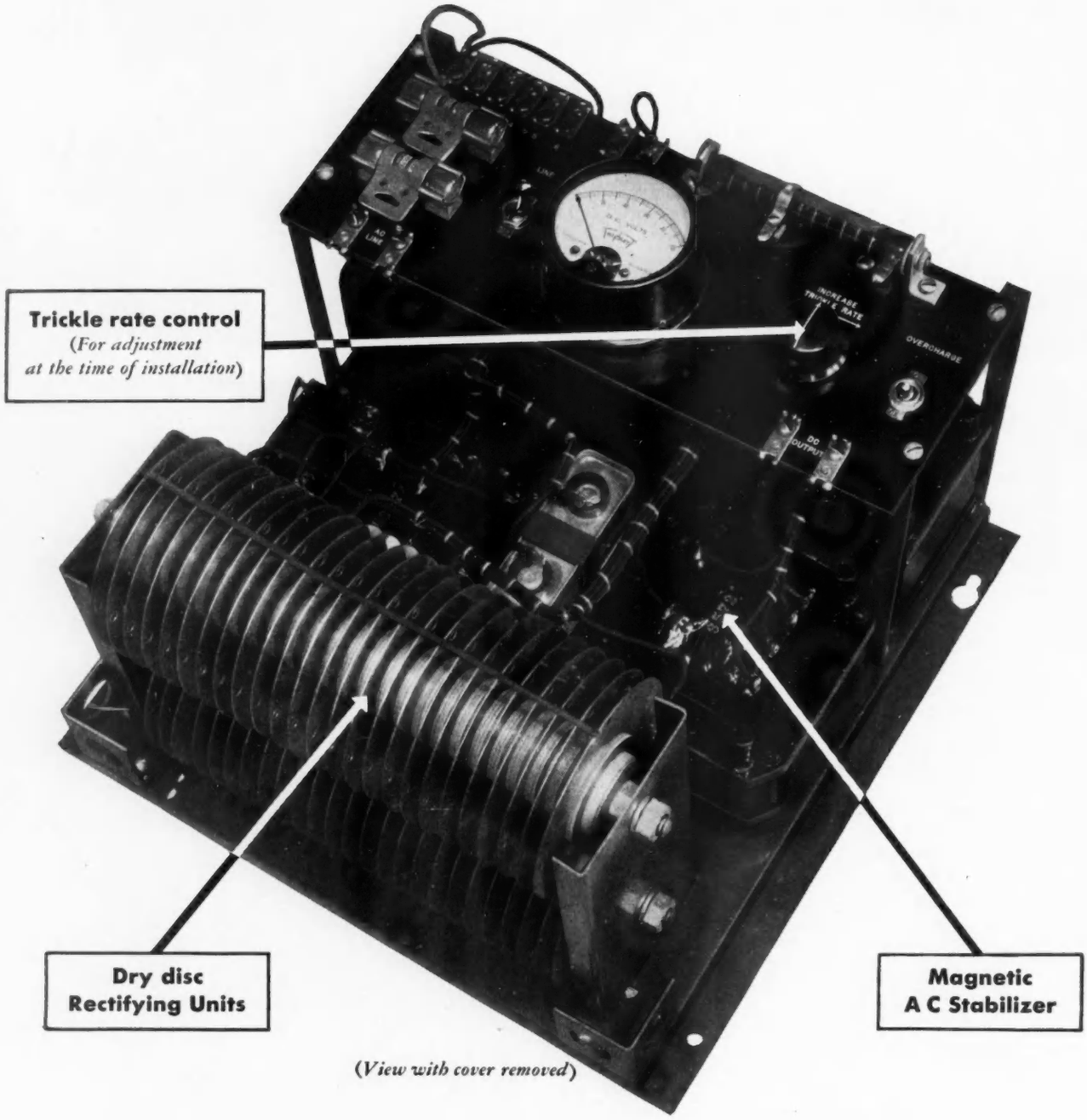

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PLUG 'em in — go away and forget 'em. What a pleasure it is to use a battery charger without moving or expendable parts. Nothing that requires frequent adjustment.

The ingenious design of the Raytheon RectiChargeR enables its output to follow the load and assume full responsibility for keeping your storage batteries fully charged, neither burning them up by overcharging nor starving them by undercharging.

Battery life may be increased as much as 40%.

Operating difficulties such as under and over voltage, short lamp life, incorrect ringing and sticking relays are automatically eliminated.

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190 WILLOW STREET, WALTHAM, MASS.

Please send your illustrated literature on Raytheon RectiChargeRs.

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Address.....

.....

10TE

25 YEARS AGO THIS MONTH

Taken from TELEPHONE ENGINEER files of August, 1917.

TWENTY-FIVE years ago the army officers at Camp Dix in New Jersey had first class telephone service. The camp had a nine position switchboard to take care of several hundred telephones.

★

The "First Independent Company A" of the Signal Service Corps U. S. Army, was sworn in during August, 1917, and ordered out for training. This company was raised in Waco, Texas, and made up entirely of Independent telephone men gathered from that field throughout the state of Texas, W. S. Smith of Cooper, Texas, was first lieutenant of the Independent company A.

★

Twenty-five years ago Gustav Hirsch was comissioned a major in the Signal Reserve Corps. At that time he was consulting engineer of the Lima Ohio Telephone & Telegraph Company.

★

Communication during 1917 was also perfected at Rockford's Army city in Illinois. There were six hundred telephones in service and a six section switchboard to give the army forces the best service obtainable.

★

Seventy-five members of the Central Indiana Independent Telephone Owners' Association met in their annual session July 17, 1917, in the Chamber of Commerce rooms at Columbus, Indiana. An interesting and instructive program was given.

★

Charles E. Heston was called to the service of his country during 1917 being awarded a captain's commission in the U. S. Signal Corps. At that time he was manager of the Rochester sales department of the Stromberg-Carlson Telephone Manufacturing Company.

ESSENTIAL POLE LINE HARDWARE COMES *FIRST*...

The battle against time to put power where it's most needed for war production calls for "weapons" as carefully chosen for their particular job as those for the fighting front.

Hubbard pole line hardware saves time for the lineman because of uniform dimensions, accurate threading and convenient design. Extra strength enables it to hold fast in the face of ice-loads, storms or other emergencies. The long-lasting galvanized finish reduces future maintenance.

Your linemen get a further reinforcement, too, when you order Hubbard pole line hardware . . . *via* GRAYBAR. For your local GRAYBAR Representative knows the conditions of service in your area. To the extent that today's conditions permit, he'll see that *all* your pole line needs are met with strong, soundly designed supplies, delivered with the least possible delay.

GraybaR . . . in over 80 principal cities

EXECUTIVE OFFICES: GRAYBAR BUILDING, NEW YORK, N. Y.

Conducted by B. C. BURDEN, Technical Editor

Line AND Desk

Q. What is the difference in effect on crosstalk of the four types of phantom transpositions?

A. The following figure illustrates the action of the four types of phantom transpositions.

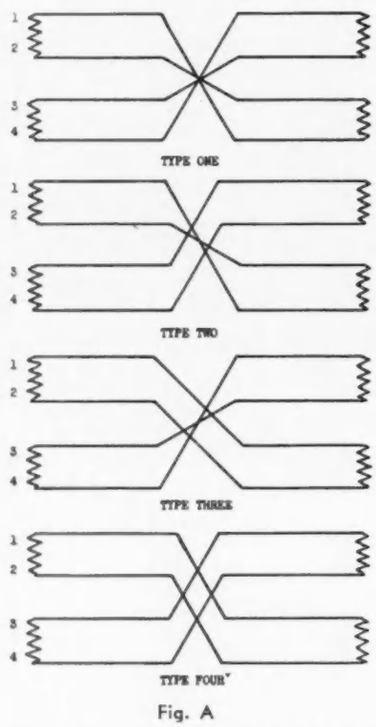


Fig. A

Type No. 1—Transposes side circuits to outside untransposed circuits—phantom to outside circuits, and phantom to groups on same lead.

Type No. 2—Transposes side 3-4 to phantom and side to side, also phantom to outside exposures, and side 1-2 to outside exposures.

Type No. 3—Transposes side 1-2 to phantom, and side to side, also phantom to outside exposures, and side 3-4 to outside exposure.

Type No. 4—Transposes both sides to phantom, phantom to outside exposure. Does not transpose side circuits.

Q. Why is it generally desirable to add parafine oil to the parafine used on pulp insulated cable?

A. The addition of oil makes the pulp insulation easier to work particularly in cold weather. The percentage of oil to be added to the parafine will depend on the temperature ranging from 50% for temperatures below 10°-F to none required at temperatures above 75°-F.

Q. What is the approximate pressure at which cables under gas pressure are maintained?

A. The pressure depends on the outside temperature, for example, at 80°-F the pressure is usually about 13 lbs. per sq. in. At 25°-F the presure is only 10 lbs.

Q. Please explain the principal of the inductive tone test sets of the West type.

A. This set consists of a generator similar to the regular type but equipped with special communtator spring which is mounted on the end of the armature shaft. This commutator is synchronized so as to discharge a condenser at a periodic rate depending on the speed which the crank is turned. Interrupted tone passing over the telephone line will, if the line is shorted, return to the source setting up a substantial current flow. This flow in turn will induce a voltage in a binder coil which is held over one of the line wires. The voltage sets up an audible tone in the receiver which will enable the tester to determine in which direction from the testing point the fault lies. The lower the resistance of the trouble, the more pronounced will be the tone which is picked up. The circuit of the West test set is shown in Figure 1.

Q. What type of solder should be used for wiping cable joints?

A. Solder which contains 30% tin and 63% lead is most suitable for wiping purposes. (If you can get it.)

Q. Explain what is meant by a "Transposition Section."

A. This refers to a fixed system of transpositions that are applied to a section of line and which provide both a crosstalk and inductive interference balance for the circuits on the lead. Transposition sections are usually eight miles in length although shorter sections are also used.

Q. Should the numbers of each cable pair on the MDF be stenciled on the terminal blocks?

A. Ordinarily only each fifth pair is numbered. It is not practical to number every pair as the numbers would be too close together.

Q. What protection should be given ground wires on telephone poles?

A. A half round wooden molding should be placed over the wire as to protect it for a distance of eight foot up from the ground line.

Q. What precautions should be taken to protect an extensive cable plant against serious damage where high voltage wires are carried on the same poles?

A. No special precautions are taken on joint use cable leads where the voltage is less than 5000 volts other than to provide adequate clearance between power and telephone circuits. Where the power voltage is higher than 5000 volts it is a good plan to ground the messenger at frequent intervals. The ground usually consist of ½" x 8" copper rod connected to the messenger by means of a No. 6 copper wire. Where 3 bolt suspension clamps are used, the ground wire can be placed under the head of one of the bolts.

Q. How is a Megger used in the telephone field?

A. The Megger is used to check the insulation resistance of cable pairs and because of its ability to measure extremely high resistances, it is useful in detecting defective insulation.

IMAGINE A RUNNER OUT-SPEEDING MECHANIZED FORCES

ALL-DAY RUN BY JOHN ADAM HELMER SAVES LIVES OF MOHAWK SETTLERS (AUGUST 1778)

CENTRAL New York State saw some of the bitterest fighting of the Revolutionary War. From it came many thrilling incidents, one of which is the run of John Adam Helmer.

In August, 1778, four scouts were sent out from Fort Schuyler (now Utica, N. Y.), to find the position of General Brant and his Army heavily reinforced by Indians. On the Unadilla River, they unexpectedly encountered the Indians on their way to attack and three of the scouts were killed. The fourth, John Adam Helmer, escaped and after an all-day run, hotly pursued by the hostile Indians, reached German Flats (now Ilion, N. Y.). There he warned the populace of the approaching hordes. Acting promptly on Helmer's warning, the residents escaped to Fort Herkimer before the settlement was raided and completely burned. Thanks to Helmer's heroism, only two men lost their lives.

It would be fantastic to assume that a runner today could hope to outspeed a mechanized column. The warning would now come from an observation plane and the danger signals relayed to every threatened locality by means of ground communications.

Stromberg-Carlson is serving Uncle Sam by building essential wartime communication equipment—radios, telephones, and switchboards—to tighten our defense and to make our offense more efficient. In the field of war communications, Stromberg-Carlson is winning the same enviable reputation for high quality it has won in other fields.

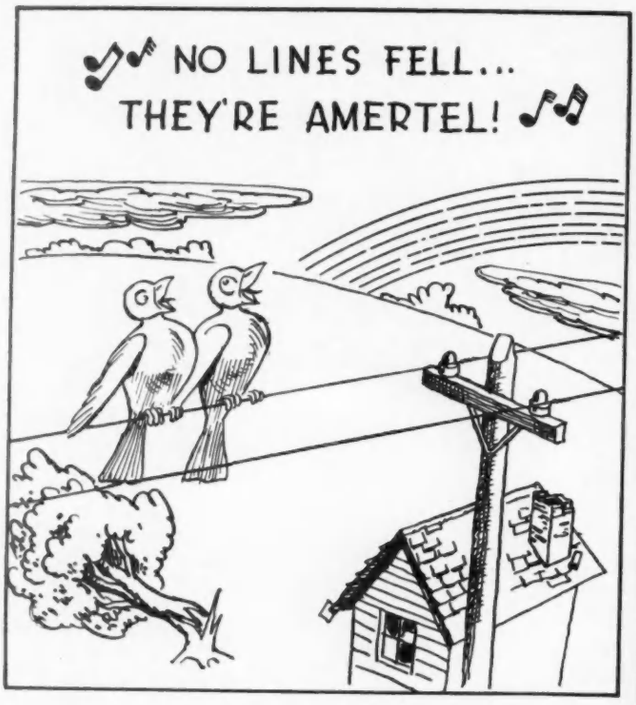
Our workers are proud to *"Help Stromberg-Carlson Help America—There Is Nothing Finer."*

Stromberg-Carlson Telephone Mfg. Co., Factory and General Offices: 100 Carlson Road, Rochester, N. Y.; Branch Offices: Chicago, Kansas City, San Francisco, Toronto

Stromberg-Carlson

MAKERS OF VOICE TRANSMISSION AND VOICE RECEPTION APPARATUS FOR FORTY-EIGHT YEARS

Number 4 in a series showing old methods of war communication



LINEMEN feel like singing, too, when they see how the extra strength of AMERTEL Wires helps to bring them through tough storms in tip-top shape. AMERTEL-85 and -135 are far stronger than the standard "BB" grade, and are equal or superior in telephonic transmission qualities. And this greater strength permits the use of longer spans, with resultant reduction in construction and maintenance costs.

AMERTEL Telephone Wires — including standard "BB", "EBB" and "Steel" grades—as well as AMERSTRAND Steel Strand, are made to a high standard of "Controlled Quality". Every step, from ore to the finished product, is under strict control and supervision. To add life to the wires, a coating of high-quality zinc is applied by the "hot dip" process. This forms a chemical bond between the zinc and the steel—providing a galvanizing finish that won't peel or flake.

Sold By Leading Distributors

USS Amertel TELEPHONE AND TELEGRAPH WIRE AMERICAN STEEL & WIRE COMPANY

USS Amerstrand STEEL STRAND MADE BY AMERICAN STEEL & WIRE COMPANY

LOOK FOR THESE TAGS.

They are placed for your protection on every coil of AMERTEL Telephone and Telegraph Wire and AMERSTRAND Steel Strand.

AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago and New York

USS Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
United States Steel Export Company, New York

UNITED STATES STEEL

An Important Message
TO
USERS AND JOBBERS OF DAVISON'S
PROTEK-SORB DESICCANT

To conserve critical material, Protek-Sorb Desiccant will come to you in glass containers when our present supply of metal containers is exhausted. For the same reason, the small (40 gram) container of Protek-Sorb Desiccant will be discontinued during the emergency.

If these changes cause you some slight inconvenience, remember—winning the war MUST come first and that inconvenience is a small price to pay toward final Victory.

When preparing splices requiring Protek-Sorb Desiccant in multiples of 40 grams, the proper amount can be estimated without difficulty if reasonable care is observed. Obviously, it is necessary to replace the top of the container securely when using only a portion of the desiccant.

THE DAVISON CHEMICAL CORPORATION
Industrial Sales Department
BALTIMORE, MARYLAND

ALBERT'S ELECTRICAL COMMUNICATION

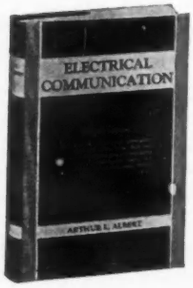
By ARTHUR L. ALBERT

•

SECOND EDITION

•

Price $5.00



A study of the various specialized phases of electrical communication as related to the usages of modern communication systems. Nearly one-third of the content has been entirely rewritten and the remainder revised to incorporate recent advances. The main revision occurs in the chapters on Sound and Acoustics, Speech and Hearing, Electronics and Vacuum Tubes, Inductive Interference and Plant Protection, Electronic Applications in Wire Communication (especially the sections on Carriers and Repeaters), and Wireless Communication.

Order From Book Department

TELEPHONE ENGINEER

Directories Use Waste Space To Further War Bond Sales

Telephone Directories Make Important Contribution In Aiding Sale of War Bonds and Stamps

TELEPHONE directories are contributing substantially to the campaign of the United States Treasury to sell War Bonds and Stamps.

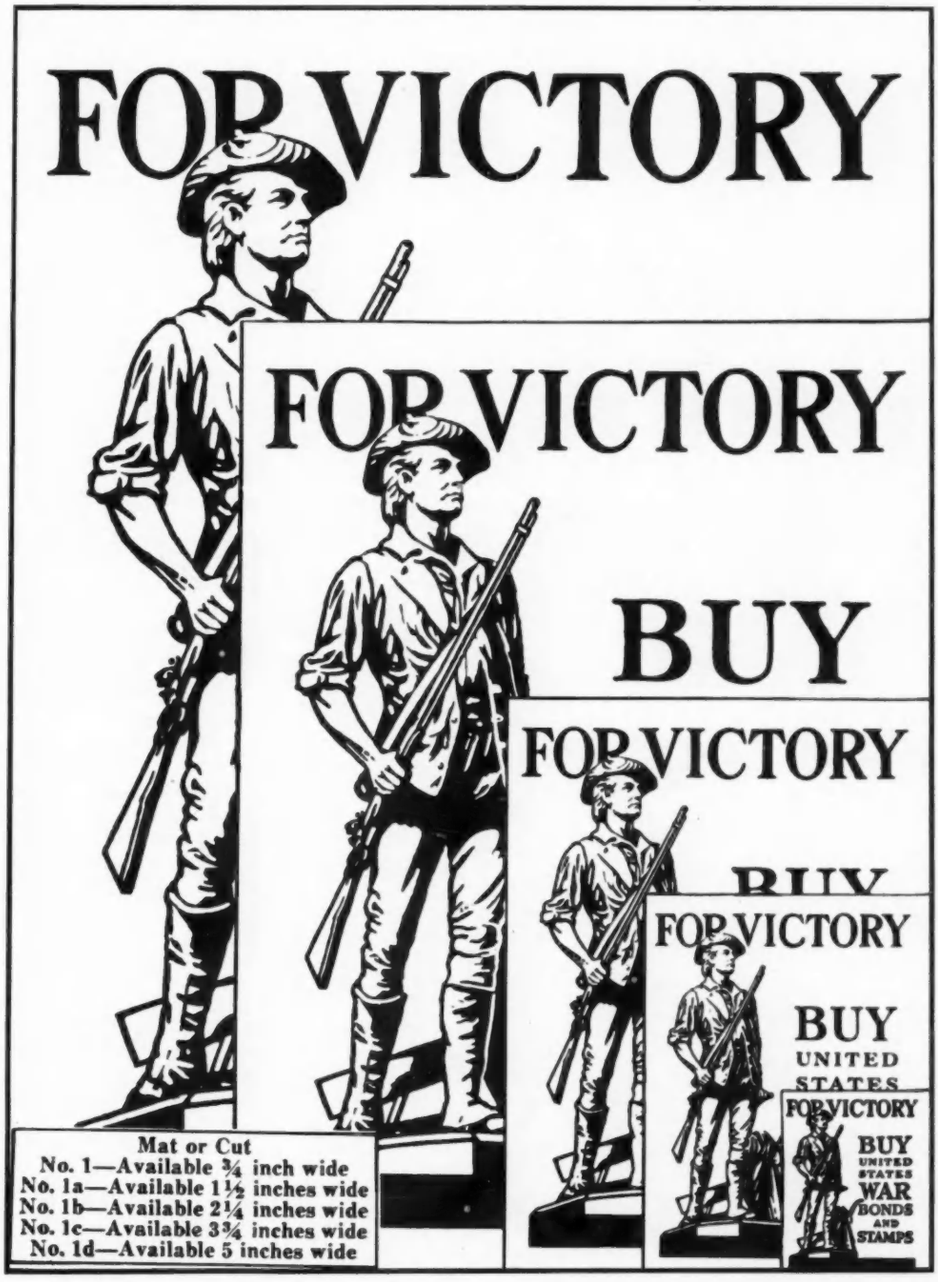
L. M. Berry & Company, Dayton, Ohio, telephone directory publishers and sales agents, who sell the advertising in telephone directories covering over 3200 cities and towns, are utilizing outside front cover space, as well as available alphabetical and classified space to advertise War Bonds and Stamps in all of the directories which they publish, as fast as new issues are printed. In directories published by telephone companies, where the Berry company acts as advertising sales agents, the same plan has been submitted, and in nearly every instance has received the approval of the telephone company.

Results have exceeded expectations, and for the past several months, directories covering large cities, and directories covering small towns and villages and rural sections have been coming from the presses of many printers over the country, all carrying "Buy" messages for "War Bond and Stamps."

Telephone directories have no waste circulation, they are a necessary part of telephone service, and are constantly before tens of millions of people every day during the year. Persistency is always a necessary attribute of good advertising, and telephone directories with their "Buy War Bonds and Stamps" copy are a powerful daily reminder to millions of people of a paramount duty in this war.

While this advertising campaign will sell and aid in the selling of War Bonds and Stamps, it should be explained that the space utilized is in most cases waste space. Formerly such spaces were filled with a variety of messages. The different services offered by the telephone company were advertised; and some of them still are, civic organizations ran data on the advantages of the town; telephone directory advertising was itself advertised; and sometimes odd bits of information such as tables of weights and measures were used to fill up these otherwise blank spaces. Such matter is known as "filler copy".

A wide variety of spaces break open and must be filled with such copy. Thus, an advertiser on a cover goes out of business just before the book goes to press. The space left open is covered up with filler copy. Printers usually run pages in multiples of four. While they can and do print two page forms, these are usually hard to bind into the book so that they will stay there. When the last page of the new directory is locked



Above are shown five sizes of cuts which will be supplied without charge by writing "Defense Savings Staff, Treasury Department, 709 Twelfth St., N. W., Washington, D. C.

These are typical of a wide variety of cuts which can be secured without charge from the above address.

up, it may be page number 53. If the printer wishes to run a two page form, there is still a page 54 that must run and which will carry filler copy. If the printer will not run less than a four page form, then three pages are open for filler copy, for the book must run to page 56. Sometimes anticipating these awkward open pages at the end of the book, filler copy will be run in marginal and liner spaces throughout the book.

THE classified section comes in for its share of filler copy. Advertisers wish their advertisements to appear on the same pages as their listings for the classification under which they are advertising. To secure this result it is often necessary to shove a classification forward through the use of filler copy. Or a column may end in the middle of an informational listing. Type being metal, it cannot be squeezed, so a filler is used to move the listings forward until the column will end on a listing. You can readily see from the foregoing that "War Bond" copy can be placed in almost all sections of the book, and that it will occupy space varying from a full page down to a very small space.

Liners reading "Buy U. S. War Bonds and Stamps" are being carried across the top margin of the outside front cover of a constantly increasing number of telephone directories. This does not in any way interfere with the paid advertising which may appear on the front cover. In addition, the familiar cut of the Minute Man, with musket in hand, with the words, "For Victory Buy United States War Bonds and Stamps", is being printed on the front cover of countless telephone directories, usually at the right or left side of the center section, in an appropriate panel. Other spaces being utilized are on the inside front, inside back, and outside back cover; top and bottom liners in the alphabetical section; top and bottom cards in the alphabetical section; split or full pages at the end of the alphabetical section; and spaces of varying size in the classified section.

The cost to the publisher is negligible. The space is there,—the directory would have an unfinished appearance if this waste space were run blank, so the only cost lies in the composition charge of the printer, and the cost of whatever cuts are run. Even the cost of the cuts can be eliminated if the publisher wishes to avail himself of the free cut service of the United States Government. They have a variety of cuts available, which can be secured by writing "Defense Savings Staff, Treasury Department, 709 Twelfth Street, N. W., Washington, D. C." They only ask that these cuts be used in "War Bond" copy.

As to the copy itself, L. M. Berry & Company offers, without charge, all copy that they have used, to any telephone company that will write for it. Their only request in return is that any other telephone company or advertising agency that has "War Bond "copy send them proofs of that copy with permission to use it. In the copy used by L. M. Berry & Company, no attempt is made to tie in with the telephone company's part in the war effort.

While the telephone systems in the United States are playing a tremendously important and vital role in winning the war, the axis plane that goes down in flames was sent there not only by a piece of telephone wire, but also by a girl who put powder in the bullets, by a machinist who made the gun barrel, by draftsmen who designed the plane, by a child who bought a war bond, by the eye and the trigger finger of the gunner, by an advertisement that sold the idea, and by a thousand and one other contributing factors, no one of whom can say, "I did it", but each one of whom could say, "I helped to do it", and of the lot, the boy at the breach end of the gun is perhaps the only one justified in patting himself on the back for the job. It is with this

(Turn page please)

Get Rid of Noise!
with the Improved
VINCENT RARE GAS RELAY

Installed in a Minute
No Moving Parts
Thousands in Service
Fully Guaranteed

Eliminates unbalance noises in metallic party lines employing divided ringing to ground. Works with either harmonic or code ringing.

Write for Catalog 39-A describing
Non-Grounding Rare Gas Arresters
Terminal Strips _ Potheads Housings

L. S. BRACH Mfg. Corp.
55-63 Dickerson St. Newark, N. J.
Signal Circuit Engineers Since 1906

A Name that Commands Respect

ACORN INSULATED WIRE

One word describes it—
"QUALITY"

NO MATTER how many words we might use we couldn't tell the story of Acorn Drop Wire more convincingly than it is told by the single word—"Quality."

Hundreds of Independents who use Acorn have good reason to congratulate themselves on their choice—Acorn "Quality" has given them the *extra* strength and the *extra* resistance to the elements that spell long life in a wire.

Renewals reduced to a minimum. Vitally important in these times of acute shortage.

ACORN INSULATED WIRE COMPANY, INC.
225 King Street, Brooklyn, N. Y.
LEICH SALES CORP., 427 W. Randolph St., Chicago
LINDSAY SUPPLY CO., 4815 Superior Ave., Cleveland

Drop Wire—Bridle—Interior—Tree—Ground—Switchboard—Pothead—Cable Terminal—Instrument—Fixture—Buried Wire

P&H PENTA POLES

'42 P&H PENTA

Poles in Immersion Tank after treating solution has been removed.

FULL-LENGTH TREATED NORTHERN WHITE CEDAR

DEPENDABLE SERVICE *at* LOW COST

To the NATURAL advantages of P & H Northern White Cedar Telephone Poles has been added a thoroughly tested and proved protection against sapwood decay and termites. The poles are completely immersed from butt to roof in a highly chlorinated phenol solution many times more toxic than other preservatives in common use.

This highly-developed, laboratory-controlled FULL-LENGTH TREATMENT is low in cost in spite of its amazing effectiveness. It is non-corrosive, non-conductive, pleasing in color. P & H "PENTA" POLES are clean, dry, odorless, light in weight, easy to handle . . . ideal for quick, economical permanent replacement of hazardous old poles *and* for new lines.

ORDER NOW, while cars are available—to help in the war effort as well as to maintain your important line service. Write for full information.

PAGE AND HILL CO.

MINNEAPOLIS, MINNESOTA · 50 CHURCH STREET, NEW YORK, N. Y.

Distributed by AMERICAN AUTOMATIC ELECTRIC SALES CO. · STROMBERG-CARLSON TELEPHONE MFG. CO.

"STILL IN THE LEAD"

SERVICE SO VITAL MUST BE MAINTAINED

Never in its history has the telephone been so vital to the nation. Swift, dependable communication—so essential to the all-out war program—must be maintained.

The telephone industry—alert to its grave responsibility—is bending every effort to repair and rehabilitate its lines; to keep operating efficiency at the highest peak.

Leading engineers are specifying *Crapo* HTL-85 and *Crapo* HTL-135 for maintenance and repair and for essential new construction. They know from experience that these high-tensile, low-resistance line wires provide an increased factor of safety, minimize service interruptions, conserve man-hours and material.

***Crapo* HTL-85 permits spans of 225 feet under heavy loading conditions; provides added strength and endurance on existing pole structures. *Crapo* HTL-135 makes possible spans of 350 feet in heavy loading districts. Both possess transmission qualities superior to standard B. B. wire.**

Write for complete technical data!

INDIANA STEEL & WIRE CO.
MUNCIE, INDIANA

thought in mind that the copy being used is limited to selling "War Bonds" only.

"War Bond" copy is now being used in over 40 percent of the directories sold by the Berry company and they expect to bring up the number to nearly 100 percent by the end of the year when all directories have been published, as many are on an annual basis.

While the cost of the space to the publisher is negligible, its value on a scheduled rate basis is considerable. Thus the July 1942 issue of the directories of the Rochester Telephone Corporation, carries over $7,000 worth of "War Bond" publicity. Of this amount $6,200 is carried in the Rochester, New York directory alone. The Peninsular Telephone Company, who have exchanges at Tampa, Florida and other West Coast Florida towns contribute space in their July 1942 directories amounting to over $3,300 a year. One directory for a city of 60,000 population carries space which would cost $862 at regular rates; another directory in a city twice that size, $1,450; a smaller directory in a town of 14,000 people, $421 another directory in a city of 31,000 population, $612; a Middle Western directory for a town of 8,000 and a rural section, $162; and a rural exchange with headquarters in a village of a little over a thousand people give $43 worth of space in their book to this cause.

It is very difficult to estimate the total scheduled value of space that will be contributed this year and before the end of the war, but is is entirely possible, if the great majority of all Independent and Bell Companies donate substantial amounts of space, that the scheduled value of this space contributed to the war effort may well run over several million dollars.

Telephone directory advertising is well suited to this job. It is a powerful medium, and can sell "War Bonds" just as effectively as it sells countless commodities and services. The telephone directory is in the homes of millions of people with the money to buy war bonds. It is used by nearly everyone in every community, and it stays beside the telephone throughout the year.

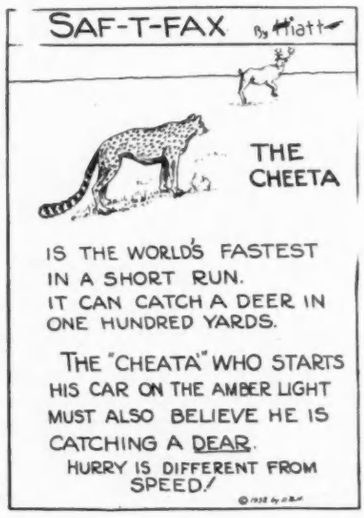
When asked what suggested running filler copy of this sort in directories handled by his company, Loren M. Berry, General Manager of L. M. Berry & Company said, "We claim no originality in using telephone directories to help sell 'War Bonds and Stamps'. I saw a whole lot of available space in telephone directories which could be used for this purpose,—we were all anxious to do everything we could to help our Government sell more bonds, so we started printing cuts, liners and copy that advertised war bonds wherever we had the space.

"Almost all advertising agencies, handling newspaper, radio, magazine, billboard and other forms of advertising have been giving freely of their time and space to this same cause. They also have received the same cooperation from their clients, the manufacturers and the distributors, that we have received from telephone companies whose directories we handle. We hope all telephone companies in the United States will contribute space in their directories for this purpose.

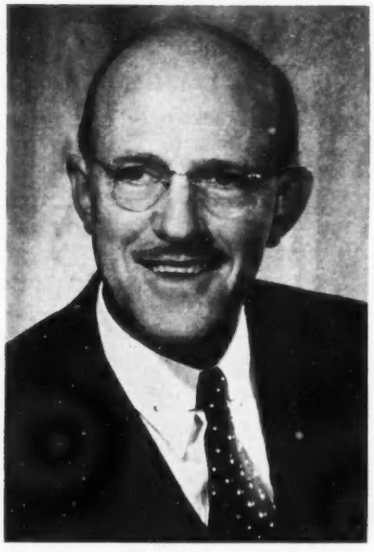
"Our idea has been to make this an out and out gift. In none of the copy that we used have we tried to work in any suggestions as to how our business or the telephone business fits in with the war picture. In all of our copy we endeavor to keep people reminded of the fact that they should buy war bonds, just as though the United States Government were paying us for the space.

"As a firm believer in the value of telephone directory advertising, I am confident that these advertisements are aiding substantially in the sale of war bonds. I urge every telephone company to use some front cover space, alphabetical liners, and classified filler copy for this purpose, and we will gladly furnish without charge copy which we are using in our directories.

I have only one idea in mind, and that is to lend the advertising power of our directories to the sale of War Bonds and Stamps or to the publicising of any other phase of the war effort, whenever we can effectively do so."


SAF-T-FAX
By Hiatt
THE CHEETA
IS THE WORLD'S FASTEST IN A SHORT RUN.
IT CAN CATCH A DEER IN ONE HUNDRED YARDS.
THE "CHEATA" WHO STARTS HIS CAR ON THE AMBER LIGHT MUST ALSO BELIEVE HE IS CATCHING A DEAR.
HURRY IS DIFFERENT FROM SPEED!

Eliot H. Cheadle



ELIOT H. Cheadle, 52, senior vice president of Associated Telephone Company, Ltd., Santa Monica, California, passed away at his home in North Hollywood on July 28 as a result of a heart ailment. Preparatory to leaving on a business trip to Chicago, Mr. Cheadle was to call at his office and when, in the late afternoon, he had not appeared, executives of the company, fearing he might be ill, went to his home, they found that he had passed away peacefully. Mrs. Cheadle was in Colorado where she had been called by the death of a sister-in-law. His death has resulted in an irreparable loss, not only to his own company, but to the telephone industry as a whole. His kindliness, fairness and genuine love of his associates had won him a multitude of friends.

We, here at TELEPHONE ENGINEER, have lost one of our best friends in the telephone industry as Mr. Cheadle was very much interested in the telephone trade press. His remarks and ideas on our editorials will be missed as well as his counsel on photography which have proved invaluable to us in recent years. More than anyone, except his immediate family, will be the loss to his fellow workers as he was truly their tried and trusted friend. He had the ability to serve as a balance wheel with his counsel and those in higher positions leaned on him for this virtue along with the workmen.

In 1912 he married Rena Leibold and the same year they moved to West Palm Beach, Florida where Mr. Cheadle had accepted a position with an abstract company. He returned to California in 1919 to become associated with an accounting firm in Los Angeles, and in 1923, having become a certified public accountant, he opened an office in the California Bank Building in Los Angeles for the practice of public accounting. He left public practice in 1925 to become auditor for the Santa Monica Bay and Redondo Beach home telephone companies and later became general auditor for other predecessors of Associated Telephone Company, Ltd. and other companies in the present General Telephone system. When Associated Telephone Company Ltd., began operations in 1929 he was elected Secretary-Treasurer, and in 1936 was elected director and Vice President.

Mr. Cheadle has taken an active part in planning the programs of the California Independent Telephone Association conventions and for two years has been a member of the executive committee of the California Pioneers. He was an amateur photographer of no mean ability, specializing in desert and mountain scenes, and many of his pictures have appeared in the Associated Company

(Please turn to page 60)

AMERICAN CROSS-ARM, INC.

The Finest Quality

CROSS-ARMS

- **WASHINGTON FIR**
- **CREOSOTED YELLOW PINE**
- **GULF-RED CYPRESS**

Distributed by:

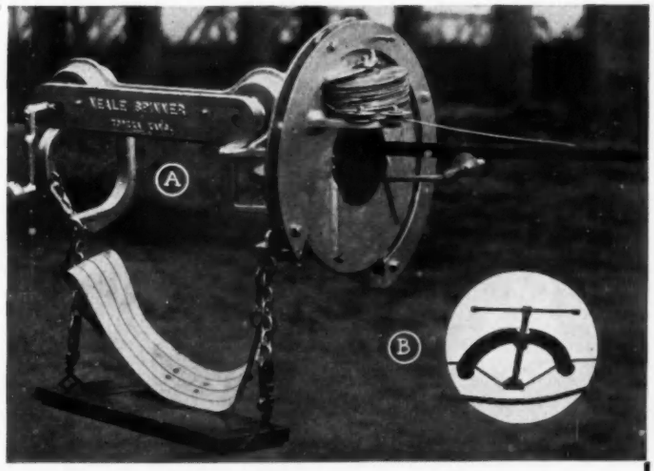
STROMBERG-CARLSON TELEPHONE MFG. CO.

Factory and General Offices: 100 Carlson Road, Rochester, N. Y., U. S. A.
Branch Offices: Chicago Kansas City San Francisco Toronto

NEALE CABLE SPINNING EQUIPMENT

- ***SAVES VITAL MATERIALS***
- **ELIMINATES Ring Cutting, Bowing, Crystallization**
- ***REASONABLY PRICED***

Pays for Itself in a Few Small Jobs



A. Neale "Model B" Spinner B. Little Giant Slack Puller

Write for New Illustrated Catalog of Spinning Machine and Accessory Tools

Distributed by:

STROMBERG-CARLSON TELEPHONE MFG. CO.

Factory & General Offices: 100 Carlson Rd., Rochester, N. Y., U. S. A.
Branch Offices: Chicago Kansas City San Francisco Toronto

It Calculates the Time Taken for Toll Calls

Eliminates Errors—Saves Time—Cuts Costs

It costs money and causes unnecessary disputes to be incorrect with the time consumed for toll calls. Why not eliminate these troubles with a Calculagraph?

It is uncanny to watch a Calculagraph print on a card the time a call is started and then automatically figure the time taken for the call, simply by pulling a lever.

You can bank on the accuracy of the elapsed time shown on the printed card because the Calculagraph can't make mistakes in figuring.

It is poor economy to pay operators to do work that a mechanical devise will do cheaper and more accurately without cost.

Write for particulars.

Calculagraph Company

Main Office and Plant:

308 Sussex Street Harrison, N. J.

CALCULAGRAPH

Accurate Toll Timing to the Second!

Telephone Engineer

HANDBOOK TABLES

By B. C. Burden

File—General Data
Date—August 15, 1942

General

The following definitions are taken from a new book titled "Definitions of Electrical Terms", published by the American Institute of Electrical Engineers, 33 West Thirty-Ninth Street, New York, and is available at a cost of $1.00. The definitions shown here are only a few of the many contained in the newly published volume.

Finder Switch

A finder switch is a switching mechanism, associated with a circuit, designed to move over a number of terminals to which are connected circuits, over any one of which a signal to start the switch may be transmitted, in order to find the specific circuit from which the starting signal has come and connect it to the circuit associated with this finder switch.

Connector

A connector is a switching mechanism designed to connect a trunk to a desired subscriber line or PBX extension and often having facilities to hunt for an idle terminal when the terminals are grouped.

Sender, Register, or Director

A sender, register or director is a part of a dial telephone system which receives pulses from a dial or other source and, in accordance with them, controls the further operations necessary in establishing a telephone connection.

Translator

A translator is a mechanism, usually permanently associated with a sender, which receives from the sender an indication of the destination of the connection and returns to the sender signals which are recorded by the sender and which serve to control the routing of the connection. Cross-connecting facilities associated with the translator permit changing such controlling signals at will.

Trunk Hunting

Trunk hunting is the operation of a selector, or other similar device, in moving its wipers or brushes to a terminal or contact associated with an idle circuit of a chosen group. This is usually accomplished by successively testing terminals associated with this group until a terminal is found which has an electrical condition indicating it to be idle.

Telegraph Selector

A telegraph selector is a device which performs a switching operation in response to a definite signal or group of successive signals received over a controlling circuit.

Crossfire

Crossfire is interfering current in one telegraph or signaling channel resulting from telegraph or signaling currents in another channel.

Text of

Priority Amendments

Order P-129 and P-130

(Continued from page 22)

(2) Except as provided in paragraph (e) (3) below, no operator who has applied the rating assigned hereby shall, during any calendar quarterly period, make withdrawals from stores or inventory of material to be used by operating construction, the aggregate dollar value of which shall exceed 110% of the aggregate dollar value of such material used during the corresponding quarter of 1940, or at the operator's option 27½% of the aggregate dollar value of such material used during the calendar year 1940.

(3) (i) Any operator whose average value of inventory of material for the five calendar years prior to January 1, 1942 did not exceed $10,000 shall be exempt from the provisions of subparagraph (1) above.

(ii) From time to time the Director General for Operations may determine that certain operators are exempt in whole or in part from the restrictions contained in subparagraphs (1) and (2) above.

(f) *Violations.* Any operator or other persons who applies the preference rating assigned hereby in wilful violation of the terms and provisions of this order or who wilfully falsifies and records which he is required to keep by this order, or who in connection with this order wilfully conceals a material fact or furnishes false information to any department or agency of the United States, or who obtains a delivery of material by means of a material and wilful misstatement, is guilty of a crime, and upon conviction, may be punished by fine or imprisonment. In addition, any such operator or other person may be prohibited from making and obtaining further deliveries of material under allocation and/or priority control and be deprived of any other priorities assistance.

(g) *Effective date.* This order shall take effect on the date of issuance and shall continue in effect until September 30, 1942 unless sooner revoked by the Director General for Operations. (P.D. Reg. 1, as amended, 6 F.R. 6680; W.P.B. Reg. 1, 7 F.R. 561; E.O. 9024, 7 F.R. 329; E.O. 9040, 7 F. R. 527; E. O. 9125, 7 F.R. 2719; sec. 2 (a), Pub. Law 671, 76th Cong., as amended by Pub. Laws 89 and 507, 77th Cong.)

Issued this 28th day of July 1942.

AMORY HOUGHTON,
Director General for Operations.

Book Reviews

The American Institute of Electrical Engineers of 33 West Thirty-Ninth St., New York have just published a new volume titled "AMERICAN STANDARD DEFINITIONS OF ELECTRICAL TERMS" which fills a long felt need for a complete and accurate book on Electrical terminology. This book deserves a place in every telephone man's library. It is available at $1.00 per copy.

The second edition of the LINEMAN'S HANDBOOK by Kurtz and published by McGraw-Hill has just been released. Selling for only $4.00 this book which covers both telephone and power linework and which contains many novel ideas and methods should prove popular with both beginners and old timers. It is available through TELEPHONE ENGINEER'S book department.

Just off the press of the Chemical Publishing Co., is a new handbook titled ENGINEER'S POCKET BOOK. This volume contains a digest of the most useful mechanical engineering tables and formulae. The price is $4.25 and can be ordered direct from TELEPHONE ENGINEER magazine.

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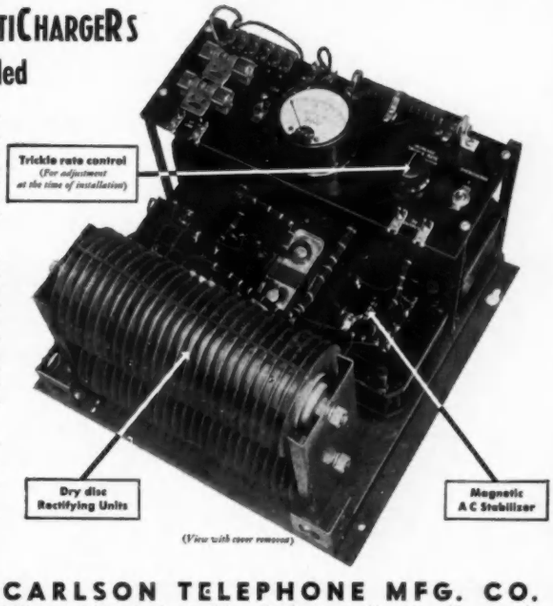

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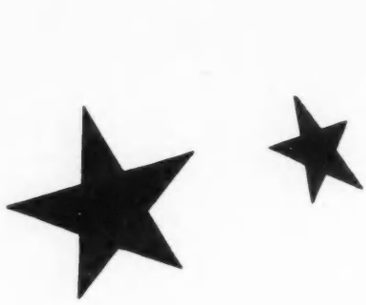

The UNITED STATES Independent Telephone Association

Is streamlining its 46th Annual Convention into a

TWO DAY Business Conference

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TWO days jammed with business of vital importance to everyone interested in the independent telephone business.

Hotel Sherman ★ October 15-16 ★ Chicago

for the guidance of those attending–
for the benefit of telephone men unable to attend–

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PRE-CONVENTION issue–October 10
CONVENTION REPORT issue–October 20

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An Extra Dividend Issue For Our Readers and Advertisers

DESIGN FEATURES OF AUDIO AMPLIFIER CIRCUITS

(Continued from page 26)

amic microphones, have low impedance, while others, such as the condenser and crystal microphones have high input impedance. The impedance of the signal source to be used must be carefully considered in the design of an amplifier for any particular use.

Low Level Input Source

Some signal sources, such as microphones and phonograph inputs develop very small signals, a small fraction of a volt, hence the **signal level** is very low, and these sources are known as **low level sources.** Some amplifiers are designed to operate from telephone lines or from the output of a preamplifier whose signal voltage may be in excess of one volt or more. Such sources are known as high level sources since they develop a comparatively high signal voltage.

Hum Pickup—It is a well known fact that whenever current flows through a wire, a magnetic field exists about the wire. The power transformers and choke coils used in the power supply of an amplifier produce intense magnetic fields about the transformers, and this magnetic field may exhibit high intensities several feet distance from the transformer. If the alternating magnetic field of the transformer "cuts" any wire connected to the grid of a sensitive high gain amplifier, a small alternating current is induced in the grid wire which will be amplified by the tube and appear as a **hum** in the output. This effect is known as "hum pickup," and considerable care in shielding must be used in the construction of an amplifier to prevent the possibility of hum pickup from stray electro-magnetic or electro static fields.

Degenerative Effect—A vacuum tube is able to amplify an alternating current signal by virtue of the fact that the signal impressed upon the grid of the tube drives the instantaneous grid voltage above and below the normal fixed grid bias, thus producing an amplified replica of the signal. In the usual amplifier stage, the fixed bias for the grid is obtained by placing a resistor in the cathode circuit and allowing the steady D.C. plate current of the tube to flow through this resistor producing a voltage drop, which makes the cathode positive with respect to the grid, in other words, the grid is negative with respect to the cathode. If the grid signal is on the positive half cycle, so as to decrease the normal grid bias, the plate current produces a larger voltage drop across the cathode resistor, which tends to make the cathode more positive, and consequently the grid more negative. As a result, the plate produces a result on the grid which is just opposite to the effect of the signal voltage; and the cathode voltage tends to neutralize the signal voltage. This effect is known as degeneration. Degenerative effects in an amplifier is prevented by placing a by-pass condenser across the cathode resistor, which shunts the alternating component of the plate current around the bias resistor, and as a result the grid bias voltage remains constant even though a signal is impressed on the

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UNDERGROUND
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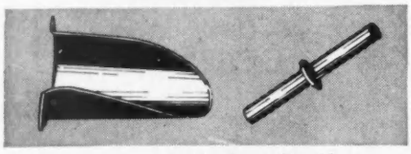
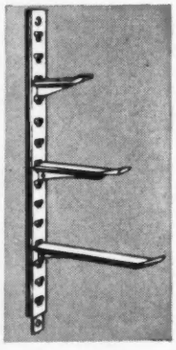


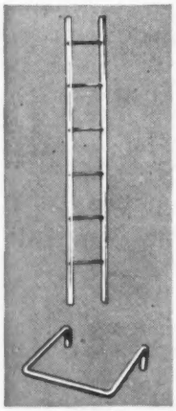
(Left, above) Cable Duct Shields protect lead cable sheaths at duct entrance against wear caused by expanding and contracting.

(Right, above) The Oliver Dowel Pin is used when connecting clay conduit, to keep adjacent lengths in proper alignment.

UNDERGROUND CABLE RACKS . . .

Ideal for manhole and interior cable work. Provide almost any length and arrangement of supports. Hooks are made of mild open hearth steel, hot galvanized, with well rounded corners and broad bearing surfaces to prevent injury to cables. Used with or without insulators.





MANHOLE LADDER AND STEPS . . .

Made in five lengths, 6-1/2, 8, 10, 12 and 14 feet, Oliver Manhole Ladders meet the specifications of large telephone and central station companies. The sides are steel channel sections and the rungs are 5/8 inch diameter, spaced 12 inches. Hot galvanized. Manhole Steps are forged steel, hot galvanized. Suitable for imbedding in either brick or concrete walls.

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tube. Fig 2-A shows how this takes place.

Audio Stage—The term "stage of audio amplification" refers to the complete circuit from the grid of one tube to the plate of the same tube including the grid coupling resistors and the plate output resistor or transformer. Figure 2 illustrates some of the above terms.

Voltage and Power Amplification—The usual purpose of an audio amplifier is to boost or amplify feeble A.C. voltages to a value such that they are capable of operating headphones, loudspeakers, or for **modulating** a radio transmitter. In some cases the voltages to be amplified are D.C. and this requires a special type of amplifier. The ordinary audio amplifier cannot be used to amplify D.C. voltages.

It is customary to refer to the amplifying stages preceding the final tubes in an audio amplifier as **voltage amplifying stages.** This terminology arises from the fact that in most audio amplifiers, all or most of the tubes preceding the **power stage** do not supply power but merely voltage to swing the grids of the succeeding tubes. If the grid of a vacuum tube does not carry sufficient negative bias it will swing positive, and grid current will flow hence the stage preceding the driven stage must supply some power. The tube preceding a pair of tubes operated Class B is a typical example of a stage that must supply a small amount of power in its output circuit. This is due to the fact that the grids of tubes operated Class B are allowed to swing positive.

The **power stage** is generally understood to mean the stage which actually delivers power to the loudspeakers.

In general, power output stages must have fairly low plate impedance, as power cannot successfully be supplied from a high impedance source due to the fact that a great deal of energy would be lost internally in a tube having high plate impedance. This is also true of driving stages which supply power to swing the grids of Class B stages.

The voltage amplifying stages on the other hand can and usually do have high plate impedance as they are not called on to supply power. Figure 3 illustrates the essential difference between voltage and power amplifying stages.

Affirms Injunction

The New York Appellate Division affirmed without an opinion the state supreme court's injunction against hotels making special charges for telephone calls above the rates fixed by the state commission.

LETTERS

from TELEPHONE ENGINEER readers

Dear Sirs:

I have read your Wire Chief's Training Course articles with a great deal of interest and would like to report an experience I recently had in making cable repairs the arc weld way. I don't claim to be a cable man and my method of repairing one might not meet with the approval of a professional.

Recently one of our underground 75 pr. cables developed a leak at a "y" joint and this meant putting in a two inch split sleeve three feet long! As there was not a cable man available I had to attempt the job alone. After boiling out the pairs in the usual way I carefully beveled the edges of the sleeve, according to your directions and put it on. Next, I took the blow torch and heated the sleeve until I could flow wire solder the entire length of the sleeve. Next I took an ordinary wiping cloth in one hand and the torch in the other and heated the joint a second time until I could wipe it down smooth, until the joint was hardly noticeable. Next I carefully heated in the ends of the sleeve until they were quite snug around the cable sheath. After cleaning the ends of the sleeve, I again heated the cleaned surface and found that the wire solder flowed around the cable and closed the seam between the sleeve and the cable sheath. When the seam was closed at both ends of the sleeve, I applied the heat treatment a second time and wiped the solder over the ends of the sleeve until the job looked like it had been done by a professional.

A sleeve put on in this way takes very little solder and by using the flame and the wiping cloth, no extra filing is necessary and the job turns out nice. This method also works well on a cable that has been opened and closed without a sleeve. I used a resin cone solder and a very little soldering paste and found that when the place to be repaired is properly heated, the solder will flow smoothly over the seam and make a perfect airtight job. I have recently cut in a short length of new cable and put on two small sleeves to a 16 pr. lead and found it to work out fine; this cable is also underground and shows clear at 10,000 ohms, so I believe it will work out.

Do you think this method has any possibilities?

Yours very truly,

Alvin Samuelson
Elmdale Telephone Co.
Upsala, Minnesota

(Ed. Note: Reader Samuelson is an opportunist extraordinary. We welcome his letter and idea.)

Lockard Receives Commission

Staff Sergeant Joseph L. Lockard, who manned the aircraft detector which picked up the approach of the attacking Japanese air force 132 miles before it reached Pearl Harbor Dec. 7, was graduated from the Fort Monmouth, N. J., Officer Candidate School and commissioned a second lieutenant July 12, one day in advance of the remainder of his class of 855 new Signal Corps officers. Fort Monmouth celebrated also its 25th anniversary July 9, with the dedication of a new sub-post.

Lieutenant Lockard received his gold bars from Brigadier General George L. Van Deusen, commandant of Fort Monmouth, in a special ceremony broadcast over the Columbia Broadcasting System. Full commencement excercises for the class were held July 13 in the new open-air theater at the Signal Corps post. General Van Deusen awarded the commissions and delivered the graduation address.

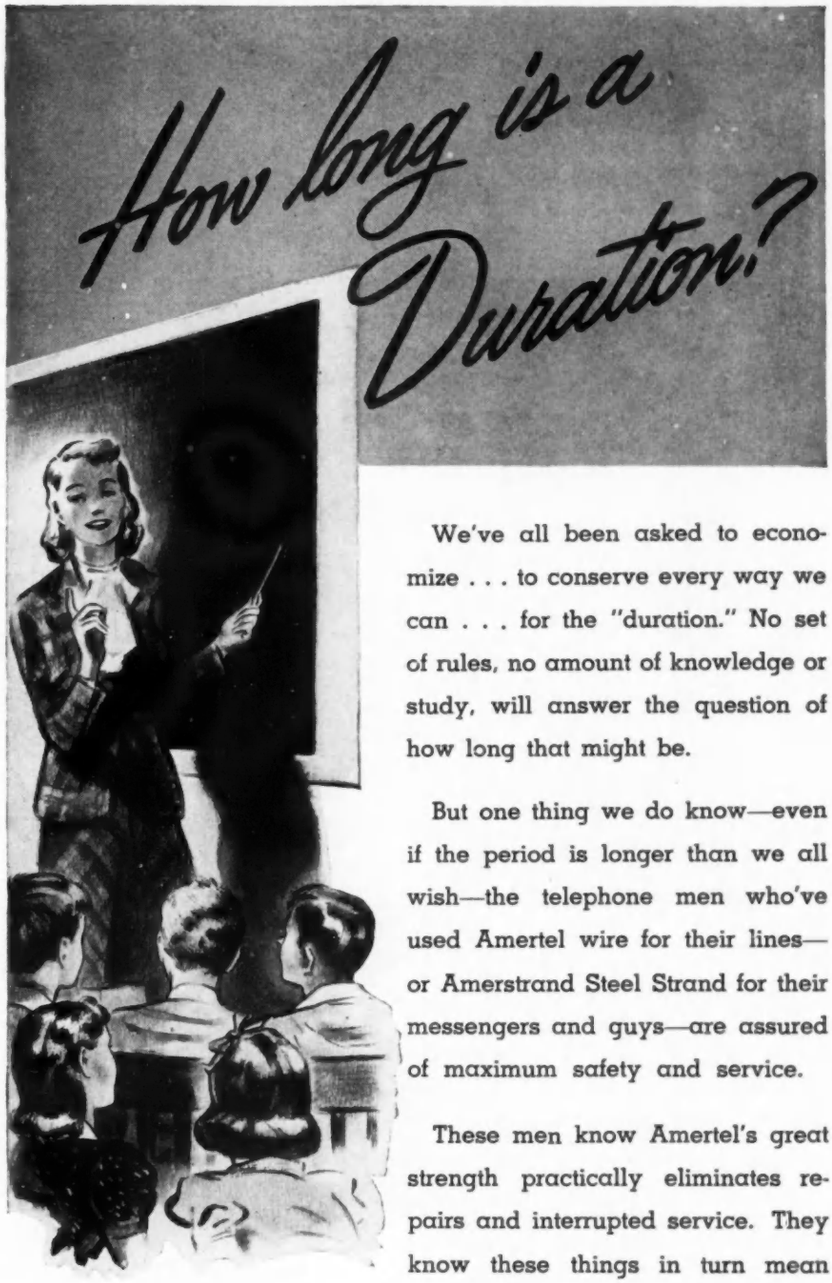
Walter D. Humphrey

FCC Principal Attorney Walter D. Humphrey, a member of the Commission legal staff since 1935 and a former associate of Commissioner Paul A. Walker on the Oklahoma Corporation Commission, died August 1 at Tulsa, Okla., after an illness of several months. He was 66 years old.

At one time one of the most prominent lawyers in Oklahoma, Judge Humphrey had served with the FCC Law Department in its Common Carrier Division and formerly with its Telephone Division since Feb., 1935. He had been with the Oklahoma Corporation Commission for eight years before coming to Washington as a commissioner and as general counsel. He also had been a member of the Oklahoma Tax Commission, having been named to that agency when it was created. He was one of the delegates to the Constitutional Convention of Oklahoma when it became a state. The funeral of Judge Humphrey who is survived by his widow and one daughter was held Aug. 3 at Tulsa.

Telephone Company Quits

The Ogallah, (Kan.) Telephone Company owned by Arthur Matteson has been dissolved, subject to the approval of the Kansas State Corporation Commission. The present plans call for an extension of the Wakeeney lines to service Ogallah subscribers.



We've all been asked to economize . . . to conserve every way we can . . . for the "duration." No set of rules, no amount of knowledge or study, will answer the question of how long that might be.

But one thing we do know—even if the period is longer than we all wish—the telephone men who've used Amertel wire for their lines—or Amerstrand Steel Strand for their messengers and guys—are assured of maximum safety and service.

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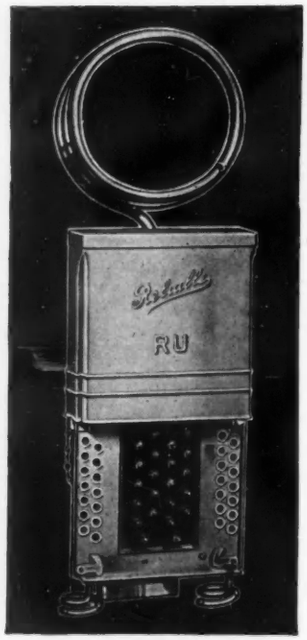

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Reliable
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Personals from the field

(Continued from page 27)

sold to the **Peoples Mutual Telephone Co.** of Davis, Ill.

•

Leslie A. Gritten, secretary of the Oregon Independent Telephone Association, brings out a good point in their Association Bulletin of August 1st. He answered criticism of telephone plant workers and operators for not taking shifts at control stations or other defense projects that need full attention when incidents occur. His statement that telephone men must report to their jobs to serve as the "nerve center" of all activities has been upheld by army officers who authorized him to publicize his statement.

•

Ida C. Tirney who began her telephone career as an operator in San Francisco in the early 1900's, was recently made an assistant vice president of the Pacific Telephone & Telegraph Co. We understand she is the first woman to become an assistant vice president of a Bell system operating company.

•

F. D. Walthour, of Cleveland, is the new president of the N. C. Kingsbury Chapter, Telephone Pioneers of America, the election having been held in Cleveland at a meeting of delegates from all parts of the state. He is outside plant engineer for the Ohio Bell northeastern area.

•

Charles M. Bracelen, general counsel for the American Tel. & Tel. Company and a native of Humboldt, Nebraska, was granted an L.L.D. degree by the University of Nebraska a short time ago.

•

Clarence, Edwin White, 56 assistant to the vice president and general manager of the Eastern Area of the Bell Telephone Company of Pennsylvania, died lately after a brief illness. He was a veteran of 36 years service to his company.

•

Promotion of **Leroy E. Lattin,** former division commercial manager of The Ohio Bell Telephone Company's Akron division, to the position of general commercial manager of the company's northeastern area has been announced in Cleveland by **John A. Greene,** Ohio Bell vice-president and general manager.

W. H. Beck

W. H. Beck, secretary of the Indiana Telephone Association, is delivering free information service on a "special delivery" method. Bill is visiting various portions of the state at centrally located points and notifying members of the date and hour of his visits. Discussions will be the problems brought in by the companies of the areas visited.

•

L. J. (Gene) Wylie, 59, died at St. John's Hospital, Springfield, Ill. on July 13. Mr. Wylie was for many years actively engaged in the Independent telephone field and was general manager for the Mt. Pulaski Telephone and Electric Company at the time of his death.

•

A. W. Herrington, president of the Society of Automotive Engineers, technical advisor to **Col. Louis A. Johnson** on the recent American Economic Mission to India, and president of The Marmon-Herrington Company, of Indianapolis, Indiana, has been elected to serve for three years as a director of the American Society of Military Engineers.

•

Alta Heflin, telephone operator at at Harlan, Iowa for 32 years, goes the distinction of being the first of the Iowa State Telephone Co., employees to go on pension in that city. After being honored at a local picnic, she retired to a well-earned vacation in the mountains of Colorado.

Wire Chief's Training Course

(Continued from page 24)

sleeve should be scraped clean on its ends and then covered with stearine before being placed. The sleeve should spread apart and slipped over the cable and then brought together and the longitudinal cuts should be soldered. What is known as **seam solder** should be used to close the seam in conjunction with a large soldering copper. Care should be taken to insure that both sides and bottom of the cut are thoroughly tinned before filling in the cut with solder. The ends of the sleeve after being beaten down against the cable sheath should be cleaned and then coated with stearine. Figure 7 illustrates the several steps in placing a split sleeve.

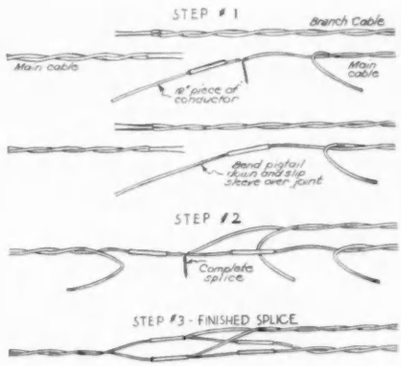
Y Cable Joints

WHERE more than one cable comes out of the end of a sleeve as for example where a main cable may branch in two directions, or at a point where a cable terminal is spliced into a main terminal, the procedure for wiping the joint is much the same as previously described except that a lead wedge cut from an old piece of cable should be placed in the crotch formed by the two cables. In wiping a joint of this type be sure that the entire joint is properly tinned before attempting to fill in between the two cables. If cold solder is allowed to flow into the crotch between the cables a leaky joint may result. Fig. 8 illustrates the general features of a Y type splice.

The Bridge Splice

LESSON No. 16 discussed the straight splice and referred to two other types of splices, known respectively as the **Bridge Splice** and the **Butt Splice.**

The Bridge splice is required where a branch cable or a cable terminal must be cut into the main cable. There are two methods for making a Bridge splice, and the method to be used will depend on the condition under which the Bridge splice is being made. When the ends of the several cables involved in the splice are free the bridge splice can be of the type as shown in Figure 9. But where a terminal or branch cable is to be cut into an existing cable it is necessary to piece out as shown in Figure 10. This type of splice requires more time because of the necessity of splicing out the main conductors. It will be observed that a 12" length of cable conductor must be spliced into the main feeder cable as shown in Figure 9. Bridge splices require considerably more time than the straight splice.



10—Making a Bridge Type Splice in Existing Cable.

Butt Splice

THE **Butt splice** differs from the **Straight splice** mainly in that the conductors being spliced together extend in the same direction rather than in opposite directions as is the case with the straight splice. After the splice is made the sleeve is slipped on and the joints wiped as shown in Figure 10.

(Turn page please)

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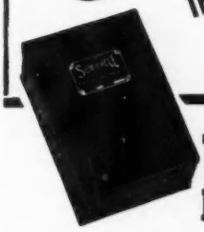

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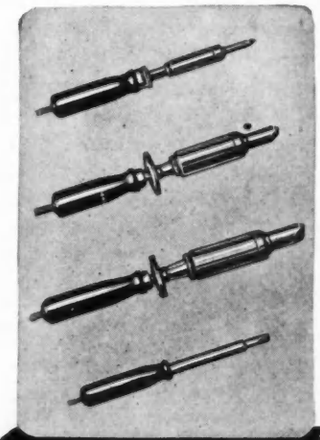

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War Savings Bonds

This space is a contribution to America's All-Out War Program by **TELEPHONE ENGINEER**

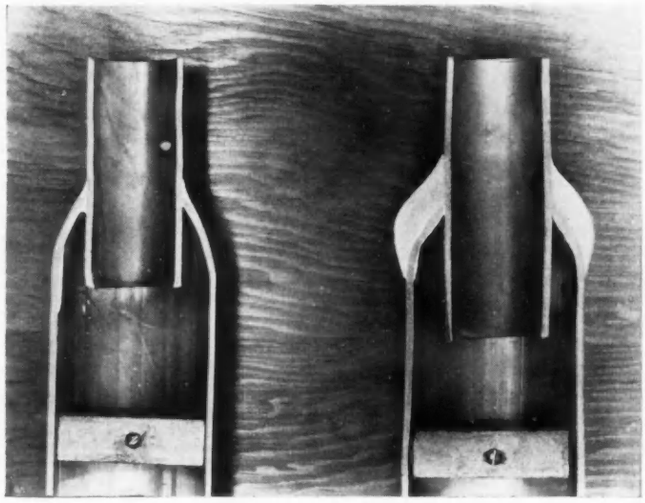


Fig. 11—Left, Victory Joint. Right, old style.

Victory Joint

DUE to the war there is a shortage of tin with the result that some of the larger telephone companies have developed and are now using what is known as the Victory Joint. The new joint differs from the old primarily in that the ends of the sleeves are beaten down against the cable so as to form a long tapered joint which requires very little filling in with solder, thus saving substantial amount of wiping solder on each joint as compared to the older type. It is found that the new joint requires only 10 to 15% as much wiping solder as the older type. In spite of this substantial saving in wiping solder, careful tests have disclosed that the new Victory Joint is just as serviceable as the older type. At Y splices, that is splices having more than one cable coming out of a joint, it is customary to use lead plugs which can be molded on the job using a special castiron form. These plugs fit in the end of the sleeve in such manner that it can be closed off with a minimum of wiping solder and still be substantial.

Dear Editor:

Just found out why I do not get my Fortnightly and TELEPHONE ENGINEER until they are very old with use. Some of the boys are getting them before me. Of course, I don't mind but sometimes they are hard to find.

If anyone has written in about the poem on "Our Unseen Friend" and asked for it may I put in my bid to have it framed or put out in a larger form. I have put mine from this issue in my scrap book. It will be handy for those people who want to gripe about our operators.

Thanks so much and thanks to Sam Shrum also.

Sincerely,
Pvt. William Rucker
854 Signal Service Company
March Field, California

Examination No. 17

CABLE SPLICING

1. **Explain the process of wrapping up the cable core after the conductors are spliced.**
2. **What is the purpose of the Stearine coating which is applied to the ends of the sleeve and cable before the joint is wiped?**
3. **How much space should be allowed for the joint for sleeves smaller than 4"?**
4. **What mixture of lead and tin is customarily used for wiping solder?**
5. **What effect on the quality of the joint will the use of too much lead in the wiping solder have?**
6. **How important is it to have the solder at the correct temperature?**
7. **Explain briefly the general procedure in wiping the joint.**
8. **Under what conditions are split lead sleeves required?**
9. **What is the difference between the Bridge and Straight splice?**
10. **What is the Victory Joint?**

★ ★ ★ ★ ★ ★

NATIONAL DEFENSE

★ ★ ★ ★ ★ ★

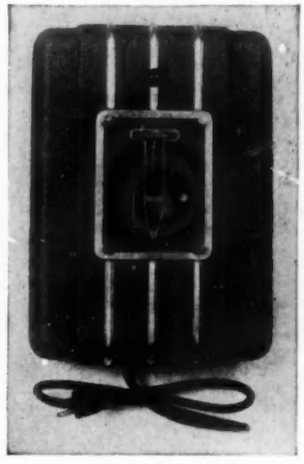
has

PRIORITY

While "all-out" National Defense co-operation is taxing our production facilities — We are proud we have been able to continue to make satisfactory deliveries to our government and to our customers in the telephone field.

TELERING

Reliable ringing service is essential in providing satisfactory telephone service.



Directly converts Commercial Alternating Current to Telephone Ringing Current—Current Consumption Negligible—Positively NO radio interference.

Use TELERING and provide the MOST reliable service at the LEAST cost.

Order through your jobber or direct from

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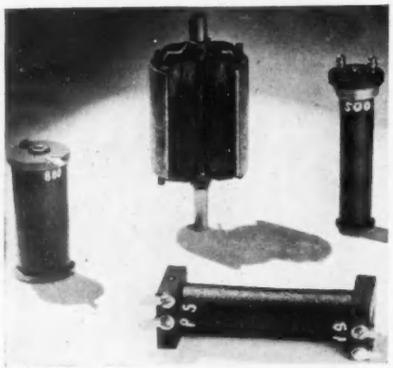

Lightning . . .

Doesn't Care About War

War or no war, lightning is going to get at a certain amount of telephone coils every month or so.

You can't get new coils today, but you certainly can keep on hand a good stock of dependable coils that Suttle has rewound for you.

Stay inside the next hot day and gather up a bunch of old coils to send in.

DEPEND ON SUTTLE

HIGHLIGHTS OF THE COMMUNICATIONS NEWS

(Continued from page 20)

terial savings in rubber, tin, zinc, lead, aluminum and nickel. The present crude rubber usage is about one-sixth that of preceding years; nickel ranges about one-third; tin about one-ninth; approximately one-fifth for aluminum and one-half the amount of iron and steel.

FCC and State Commissions Study Simplification of Separation Methods

Study Separation Methods

FOR THE telephone industry—Bell System and Independents — the FCC and the State Commission through the National Association of Railroad and Utilities Commissioners undertook a highly important series of hearings, commencing August 19, at the Morrison Hotel in Chicago to determine a new method for the separation of telephone property, revenues and expenses between interstate operations with the goal being to devise the most simplified adequate formula which would serve the purpose of rate-making investigations.

After a study of more than a year, a staff committee of expert engineers and accountants from the FCC and State Commissions (NARUC) which is headed by E. F. McNaughton, Director of Public Utilities of the California Railroad Commission, devised a simplified process of separation which is to be presented at the hearings. The new separation method program was formulated after most careful study and after securing from the Bell System and Independent industry complete assistance and cooperation. The new plan proposes simplification of the separation of central office equipment, pole line, wire plant and many other phases of telephone property and operation through a more concise means of sampling than is utilized as present. At the same time, FCC Engineer Manfred K. Toeppen, who was a member of the NARUC Cooperating Staff, has proposed a different method—the distribution of cost of service—which is totally different from the Staff Committee's plan and is tantamount to a dissenting program from the majority viewpoint.

The NARUC Committee through Mr. McNaughton will explain its plan and FCC Engineer Toeppen will describe his method (a number of regulatory observers feel it is most impractical). Then the Bell System will give its views on the respective programs. Unless the question of toll compensation comes up, it is doubtful if the U. S. Independent Telephone Association will participate in the proceedings in any extensive way. However, it was believed possible that some individual Independent telephone companies might present their views on the respective NARUC and Toeppen plans.

WON'T YOU HELP US ROLL 'EM UNDER

Electric wire and cable reels are urgently needed for vital shipments. One way you can help to "keep 'em flying" is to help *us* keep 'em rolling by returning empty spools and reels as soon as they become available.

For War Communications! Roebling Electric Wires and Cables for telephone use are made in our mills, under complete Roebling supervision.

RETURN REELS AND SPOOLS PROMPTLY

JOHN A. ROEBLING'S SONS COMPANY • TRENTON, N. J.
Branches and Warehouses in Principal Cities

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ELECTRIC WIRES AND CABLES

Another highly interesting phase of these hearings is to be on the question of whether the board-to-board or the station-to-station methods should be used in the determination of toll rates. The American Telephone and Telegraph Co. is slated to present an extensive analysis of these theories with a complete support of the validity of the board-to-board basis. A large number of Independent companies also are supporting the board-to-board principle.

FCC Doings

While this separation proceeding is deemed to be a most constructive inquiry, the FCC was engaged during the latter half of July in a trio of investigations which seemed to smack of "make work" rather than justified regulatory endeavor in the war when telephone companies' staffs are loaded up with work and are losing personnel to the armed services. Particularly the FCC legal staff appears anxious ever since the Pearl Harbor attack to plunge into new fields of regulation which have little or no relation to the war crisis. One of these proceedings was the investigation of interstate exchange rates in Iowa covering a few hundred telephones in Iowa exchange areas that were in adjacent states—the hearing in this case was postponed until January but the FCC staff was understood to be continuing its inquiry. Another was the probing of the 1925-28 sale of A.T.&T. toll plant and terminal equipment to the New York Telephone Co. in which the FCC charges the New York Telephone Co. "wrote up" its plant by $4,000,000—the telephone company showed it had had this purchase valuation approved by the Interstate Commerce Commission and the Federal courts in a rate case and the FCC and New York Commission have continued the proceeding to Sept. 16 when they will decide if the telephone company can submit evidence on reproduction cost. The third instance was a rate probe of press private line rates when the A.T.&T. objected to a separation study request and the FCC attorney indicated a separation was a war activity.

Two Vacancies Open

There are two vacancies for telephone maintenance men or installer-repairmen at the Army War College, Washington, D. C., on a war service appointment basis. The requirements of the job are those of the regular installer-repairmen except that linemen ability is not required as all plant is underground or house cable. Knowledge of station, inside wire and simple types of wiring plans is required. Readers interested should direct their application to John R. Peters, Major, Signal Corps, Post Signal Officer, Army War College, Washington, D. C. —R. C. D.

General Telephone Corp. Issues Financial Statement

A net income of $1,997, 378 for the year ended June 30, 1942, after taxes, depreciation, interest, dividends, and other charges, was reported August 3 by the General Telephone Corp. and its subsidiaries. This was equal to $2.42 a share on the 637,070 shares of common stock outstanding. For the corresponding previous year, the net was $2,295,157, equal to $3.04 a share.

The net income for the first six months of 1942 also dropped from the corresponding 1941 level to $996,696, equal to $1.22 a share, compared with 1941's $1,240,596. Federal income and excess profits taxes for the first six months of 1942 were $1,300,539, up sharply from the $766,032 figure for the like period last year.

"Ed's pretty stuck up about his New Job"

"Yes, he's going to be a T-C Pole!"

"Ed"—who is any T-C Creosoted Pine Pole—has good reason to be proud. He comes from a specially selected group of trees picked for their shapeliness and strength. He will be carefully trimmed, guarded from harm until seasoned and thoroughly impregnated with creosote. When he leaves the Taylor-Colquitt yards he is ready to give years of dependable service.

Proud? You bet—and you can be proud too if he works for you.

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BRANCH WAREHOUSES AT DALLAS, KANSAS CITY, LOS ANGELES, RICHMOND (VA.) AND SAN FRANCISCO

Left—This picture shows only a part of the throng of Kellogg workers who gathered in the company garage to witness the formal presentation of the Minute Man Flag. Right—L. H. Wilson, Kellogg Personnel Manager addressing group at Kellogg War Bond rally and Minute Man Flag presentation ceremonies. At the right is Leo Crown, a Czechoslovakian soldier who was wounded in Europe, and who spoke to the group in behalf of the United States Treasury Department

Kellogg Switchboard Receives U. S. Treasury Citation

THE Kellogg Switchboard and Supply Company held a huge War Bond Assembly at which formal presentation was made of the Minute Man Flag by the United States Treasury Department to signify Kellogg employees' 100% purchase of war bonds.

This assembly was held at noon and the lunch hours were so arranged that all the production workers and office force of the day shift were able to attend the meeting. A public address system was set up in the large company garage which was the scene of the meeting. The speakers platform was fittingly decorated with American Flags with the Minute Man insignia prominently displayed as well as a picture of General MacArthur.

The meeting was called to order at 12:00 o'clock noon by L. H. Wilson, Personnel Manager, who outlined the reason for the assembly and introduced Mr. Harold Swift, chairman of the Illinois War Savings Staff. At the conclusion of Mr. Swift's talk he presented the Treasury Department's citation to Kellogg's president M. K. McGrath. In accepting the citation, Mr. McGrath suggested that the Minute Man Flag be presented directly to the employees, and requested Joe Frome, Kellogg's oldest employee and Helen Mayersky, Kellogg's youngest employee, to receive the Flag on behalf of all Kellogg workers. Following this ceremony. Lt. Colonel Norman H. Saunders, executive officer to Colonel Clark of the Signal Corps was introduced and addressed the assembly. Lt. Colonel Saunders was previously a Kellogg employee, having been associated with the Engineering Department until he accepted the Government's call. An impressive demonstration followed in which Kellogg employees who have sons, husbands, brothers and fathers in the armed forces participated.

Helen Mayersky (center) and Joe Frome (right) youngest and oldest Kellogg employees accepting the Minute Flag from Harold Swift, Chairman of the Illinois War Savings Staff.

A number of Kellogg men, now in the service of our country, were introduced and received rousing cheers. Charles Reese, relations chairman of the Kellogg Victory Production Drive Committee and father of Sgt. Charles Reese Jr., who was present, entertained this group at a luncheon following the mass meeting. Leo Crown, a Czehoslovakian soldier, who was present under the auspices of the United States Treasury Department, then delivered a stirring address to the extremely responsive audience. He

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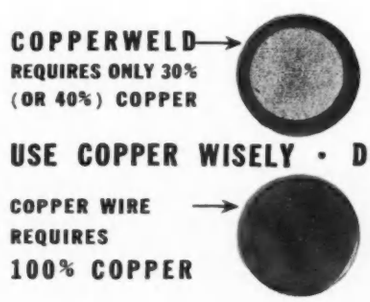
LINE WIRE

TELEPHONE companies are getting more miles of line with less copper by using Copperweld. And not only are they saving copper but they are getting all the Copperweld advantages of high strength, good conductivity, rust-resisting life and easy handling. Copperweld wire is guaranteed to have the rust-resisting life of solid copper. Copperweld wire stays new—its better voice transmission and greater safety are permanent characteristics.

Buy Copperweld Line Wire* from American Automatic Electric Sales Company, Graybar Electric Company, Kellogg Switchboard and Supply Company, or Stromberg-Carlson Telephone Manufacturing Company.

**Copperweld Drop Wire may also be obtained from all of these distributors.*



COPPERWELD STEEL COMPANY
GLASSPORT, PA.

One of the interesting speeches at Kellogg's War Bond rally was made by Lt. Colonel Norman H. Saunders, Executive Officer to Colonel Clark of the Signal Corps.

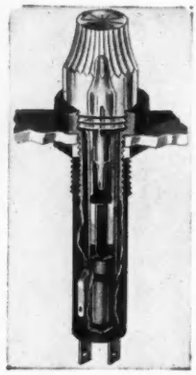
told of his experience while under fire in the European War Theatre and described conditions in enslaved nations that are now Nazi Dominated.

John Wagner, Kellogg master mechanic and chief of the Tool and Die Department lead the group in Singing patrotic songs both at the beginning and the end of the ceremony. Music for the occasion was furnished over an electric organ, was played by Robert Coe. a telephone technitican of Kellogg's Laboratory.

Reports Break in Circuit

This light goes on **only** when the circuit is broken. This is the time, trouble, and money saving service rendered by the new indicator de veloped by Littlefuse Incorporated, 4757 Ravenswood Ave., Chicago, Ill.

This indicator has wide use in railway signaling equipment and aircraft applications. But it is equally applicable to any circuits, circuit breakers, line switches etc.



When installed in any convenient or desirable point in connection with remote motor control it works instantly, with a plainly visible signal to show "on" or "off". When the circuit breaker opens the light goes on.

It can be had 24 or 48 volt filament bulb, with which no resistor is used. Otherwise it uses a built-in 200,000 ohm protective resistor, in series with a neon lamp. The resistor prevents the lamp from blowing out, as ordinary lamps do, on unexpected high voltages. In the Littlefuse installation the lamp glows on currents as low as 100 microamperes.

Complete information on applications of the Littlefuse Indicator may be obtained by addressing the manufacturer.

Three "V's for Victory"

The familiar "V" gets a new twist from three of the attractive "V" girls now taking a large part in the Stromberg-Carlson "work for victory" campaign, which has won 100% enthusiasm and cooperation from labor and management in the Rochester plant, now building communications equipment for the armed forces. They highlighted the Stromberg-Carlson "work for victory" slogan rally that played a large part in getting the program started. The "work for victory" campaign is being run in the Stromberg-Carlson plants jointly by labor and by management, covers a wide variety of morale building and production upping programs. A few Stromberg-Carlson firsts have added sparkle to the basic WPB plan.

Kellogg Names New Engineer and Assistant

R. M. Kalb a telephone engineer of long experience has been made Chief Engineer of the Kellogg Switchboard

R. M. Kalb

ESTWING
UNBREAKABLE
TOOLS

ONE-PIECE STEEL HEAD
—HANDLE WITH NON-SLIP
GRIP OF SOLE LEATHER
WASHERS

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—Yet Each Has a Sweet Temper

Their fine temper, achieved by electric forging and hardening, contribute toward making Estwing Tools superior instruments.

Ripping Claw Hammer comes in both High Polish and Velvet Black finish.

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BRANCH WAREHOUSES AT DALLAS, KANSAS CITY, LOS ANGELES, RICHMOND (VA.) AND SAN FRANCISCO

B. A. Wallace

& Supply Company, and B. A. Wallace has been made Assistant Chief Engineer.

Mr. Kalb was previously Assistant Chief Engineer for Kellogg. He is a graduate of Ohio State University, Department of Electrical Engineering and took post-graduate work at Columbia University. Later, he taught in the Electrical Engineering Laboratory at Ohio State University.

Mr. Kalb is well-known for his research engineering work on transmission and circuit problems, and for 13 years was associated with the Bell Telephone Laboratories. A number of patents have been issued to him for improvements on various telephone apparatus. He is also the author of articles on magnetics. His practical experience and thorough knowledge of communication equipment make him well-fitted for this important position.

Mr. Wallace has been with Kellogg for 28 years and is well-known to Independent telephony by virtue of his extensive engineering work. He has been associated with the Kellogg engineering department and laboratories for 26 years, specializing in central office and special switching equipment installed throughout the country. As Assistant Chief Engineer he will be mainly concerned with product engineering. Before coming to Kellogg, Mr. Wallace was maintenance superintendent for the properties of the Northern Illinois Telephone Company, which is now the Illinois Commercial Telephone Company.

Western Electric to Receive "E" Award

The Western Electric Co., in late August will combine its receiving of the new combined Army-Navy "E", the nation's highest production award, with the 25th anniversary of the first demonstration by Western Electric engineers of two-way radiotelephone communication between an airplane and the ground, the company announced August 5.

The Army-Navy "E", which Undersecretary of War Robert P. Patterson stated in a letter to Clarence G. Stoll, Western Electric president, is in recognition of the "outstanding contribution to victory" and "practical patriotism" of Western Electric workers, will cover a greater number of war workers, in the three Western Electric plants at Hawthorne, Kearny, and Point Breeze, than have ever before been granted the award at one time.

The radiotelephone communication btween plane and ground, Mr. Stoll recalled, came after the Signal Corps, in May, 1917, asked Western Electric to provide radio voices and ears for Army planes. Three months later, on Aug. 28, 1917, at Langley Field, the demonstration was staged.

•

Ian Beckwith, new owner of the May (Okla.) Telephone Exchange purchased the exchange from the Southwestern Associated Telephone Company, Lubbock, Texas.

DILLON DYNAMOMETERS
CAN PROLONG LIFE
of
WIRE AND MESSENGER

OVER TENSION DESTROYS LIFE
of
WIRE AND MESSENGER

PROTECT YOUR EXISTING OUTSIDE PLANT

MAINTAIN CORRECT TENSION
with a
DILLON DYNAMOMETER

W. C. DILLON & CO. INC.
5410 WEST HARRISON ST.
CHICAGO, ILLINOIS

You cannot buy better pole line hardware than that which bears the L-M trademark

LM

L-M has never considered pole line hardware as so much galvanized steel. It did not so consider it 31 years ago when L-M started. L-M does not so consider it now. Instead, each item is regarded as a standing challenge for its improvement, if possible. The difficulty of improving items of this nature makes that challenge more intriguing.

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Call L.D. 16, Telephone Bldg., Dayton, O.

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CORPORATION
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Eliot H. Cheadle

(Continued from page 43)

magazine and have been on display in various exhibits. A page in the company magazine was devoted each month to his wise philosophy and his delightful humor under the title "Random Shots—by E.H.C." He read tirelessly and there were none of the classics and few modern books with which he was not conversant.

Services were held at the First Congregational Church in Los Angeles, the Dr. J. H. Fifield, Jr., officiating. "He needs no eulogy," said Dr. Fifield, "for his eulogy is written in the hearts of his multitude of friends." He is survived by the widow, Rena Cheadle; a son Howard Cheadle of Santa Monica; a daughter Mrs. Louis DeLucchi of Berkeley, his mother Mrs. Amanda Cheadle of Los Angeles and two sisters, Mrs. Elsie Brownell of Redondo Beach and Miss Lorena Cheadle of Los Angeles.

Mr. Cheadle's knowledge of the telephone industry was comprehensive and his accounting and administrative ability were invaluable assets. The privilege of his friendship was extended to all whom he met. No social function of the employees was considered complete without his presence and he heartily enjoyed being with people. His experience and counsel will be sorely missed by those who were associated with him.

Sells Exchange

Neil H. Pike was given permission to sell equipment and franchise of the Perkinsville Telephone Company, Wheathersfield, Vt., to John T. Connor of Wheatherfield by the Vermont Public Service Commission in an order of July 16 resulting from a hearing at Perkinsville. Transfer and sale covers all the property of the company which includes 36 miles of line in Wheathersfield, Chester and Baltimore.

FOR SALE: Three- and five-bar magnetic wall telephones and two sections of Stromberg-Carlson No. 105 Magneto switchboard. This equipment removed from service April 1, 1942, on account of dial conversion. If interested, write Western Arkansas Telephone Company, Russellville, Arkansas.

SPLICER'S TOOLS
Of Top Quality by **UNIQUE**

- FURNACES
- SOLDER POTS
- BLOW TORCHES
- WIPING CLOTHS
- BALANCED LADLES
- SOLDER IRON HANDLES
- THAWING TORCHES
- FOLDING SAFETY SHIELDS

Protect Public, Splicer, and Furnace. No. 50 C Shield shown here. Of 22 Ga. galvanized steel. Reinforced edges. 23"x17" x17". No. 50 — four-sided with grate. No. 50 A — same without grate.

Your Jobber Has These Tools
UNIQUE MANUFACTURING CO., INC.
221 W. Walton St. — Chicago, Ill.

NEW
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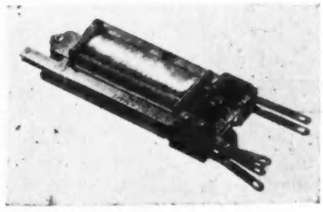

E-1153
1 SET OF MAKE CONTACTS
25 OHMS x 65 OHMS

NOT PURCHASED FROM THE MANUFACTURER BUT PACKED IN THE ORIGINAL CARTONS.

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COLUMBUS, OHIO

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For the convenience of readers of Telephone Engineer

10% Payroll Savings Plan

Nearly 100,000 of the nation's business firms have already installed, and are operating under, this plan which permits systematic purchases of War Bonds by employees through voluntary allotments from each worker's pay envelope. In most cases the management of the company absorbs the entire cost of administration and bookkeeping—and the plan is so simple in its operation that this expense is normally quite modest.

George J. Cossmann Named

On July 1 **George J. Cossmann** assumed the duties of assistant district manager of Graybar's Central District with headquarters in Chicago. Since his start with Graybar over forty-two years ago, Mr. Cossmann has held many important posts. His previous position being that of Assistant Sales Manager of the Chicago Main House. He has also taken an active interest in Association work, and has held important offices in both the Chicago Association of Commerce and the Electrical Association of Chicago.

"No wonder we aren't winning the war! The Salvage Committee won't call for that clock, they expect me to bring it to them!"

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Reconstructed Equipment

Stromberg Carlson No. 12606 20 Line Fuse rack with Mica Fuses and carbons	$ 2.50
Western Elec. Cord weights @	.15
New Cabinet 2-bar 2500 ohm Biased ringer desk or hand signal sets with W. E. Equipment. Inside connection type @	6.50
Stromberg Carlson No. 896 3-bar 1000-1600 or 2500 ohm Biased ringer compacts @ $8.00—4-bar @	9.25
New Cabinet 2-bar 2500 ohm Biased ringer compacts with W. E. equipment same as No. 1317 @	8.50
Auto Elec. or Monarch drops and jacks 10 per strip @	16.00
Western Elec. Individual No. 154 Double cut-off Jacks @	.50
Western Elec. Individual No. 218A or 108 Single cut off jacks @	.35
Electrox Rectifier complete with 4 Volt Storage Batt. @	15.00
Kellogg No. 1000 type Swbd. Key with 1 No. 1013 and one 1042 Key on No. 1026 Mtg. @	2.75
W. E. No. 1269 Arresters with Heat coils and carbons 40 line per bank @	20.00
W. E. No. 1078 type fuse rack 60 lines per bank with Fuses @	5.00
Stromberg Carlson Listening and Double ringing key with extra Double locking key with 4 break and 2 Make and 4 break contacts	3.00
Kellogg No. 2800 4-bar 1000 ohm ringer compacts @	9.25

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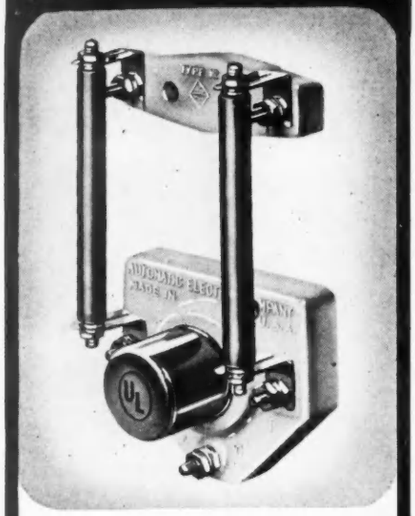

Substation apparatus is really secure when safeguarded by SANDS protectors. Strong, extra-rugged construction typifies their design. Terminals are widely separated—easy to reach and handy for wiring.

Then, too, on SANDS substation protectors as on all SANDS protection products, the Type 2105 discharge block is standard equipment. This unique device not only is self-grounding on heavy currents, but also automatically resets itself when the current ceases. It thus provides complete and continuous protection from dangerous potentials, and in addition saves resetting and maintenance expense — factors which explain the increasing popularity of SANDS products among telephone companies everywhere.

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AUTOMATIC ELECTRIC

TELEPHONE, SIGNALING AND COMMUNICATION APPARATUS

Index to Advertisements

A

Acme Visible Records, Inc. —
Acorn Insulated Wire Co. 40
Affiliated National Hotels. —
American Creosote Works. —
American Crossarm & Conduit. —
American Crossarm, Inc. 43
American Elec. Heater Co. 51
American Steel & Wire Co. 38-49
American Tel. & Tel. Co. 12-13
Anaconda Wire and Cable Co.
Armstrong Cork Co. 6
Associated Tel. and Tel. Co. —
Automatic Electric Co.
14, 16, 32, 33, 49, 51, 55, 58, 62
Automatic Tel. & Elec. Co., Ltd. —

B

Banks Mfg. Company —
Barnard Co., B. S. —
Bartlett Mfg. Co. 45
Berry, L. M. 60
Brach, L. S. Mfg. Co. 40
Buckeye Telephone Supply Co. 60

C

Cable Spinning Equipment Co. 43
Calculagraph Co. 44
Carney & Company 60
Carpenter Mfg. Co. —
Chance Co., A. B. —
Channel Splicing Machine —
Chisholm-Ryden Co., Inc. —
Churchill Cabinet Co. 6
Coffing Hoist Co. 38
Communication Equipment & Engineering Co. —
Cook Electric Co. 7-29
Cope, T. J. Inc. —
Copperweld Steel Co. 57
Cramer Company, Inc., R. W. —

D

Davy Tree Expert Co. —
Davison Chemical Corp. 38
Dicke Tool Co., Inc. —
Dillon, W. C. & Company 59

E

Electric Storage Battery Co., T. 11
Estwing Mfg. Co. 58
Eveready Dry Cells 18
Everstick Anchor Co. —

F

Fansteel Metallurgical Corp'n. —
Forged Steel Products Co. —
Fyr-Fyter Co. —
Four Wheel Drive Auto Co. 8

G

Gardiner Metal Co. —
General Cable Co. 14-31
General Electric Co. —
Graybar Electric Co. 35
Gray Manufacturing Co. —

H

Hammond Drierite Co., W. A. —
Herdrich & Boggs —
Holtzer Cabot Electric Co. —
Hubbard & Co. —

I

Indiana Steel & Wire Co. 6-42
International Tel. & Tel. Co. 15

J

Jackson Lumber Co. —

K

Kearney Corp., Jas. R. —
Kellogg Switchboard & Supply Co. 4-5-6-7
Kester Solder Co. —
King W. T. —

L

Leeds and Northrup Co. —
Leich Sales Corp. 2-3
Lenz Electric Mfg. Co. —
Line Material Co. 59
Loomis Advertising Co. 61
Lorain Products Co. 51

M

W. N. Matthews Corp. 6
MacGillis & Gibbs —
Michigan Pole and Tie Co. —
Jay G. Mitchell 60

N

National Carbon Co. 18
National Telephone Supply Co. 7-63
North Electric Mfg. Co. 64

O

Oliver Iron & Steel Corp. 48
Oneida Cedar & Lumber Co. —
Owens-Illinois Glass Co. 47

P

Page and Hill Co. 41
Paine Company, The —
Paragon Electric Co. 7
Paramount Products Co. —
Pearl, Wm. H. —
Peatrophone Corp. —
Phillips Electric Works, Ltd. —
H. K. Porter, Inc. —
Premax Products —
Putnam & Company —

R

Raytheon Mfg. Co. 39-45
Rebuilt Electric Equipment Co. 61
Reliable Electric Co. 50
John A. Roebling's Sons Co. 54
Runzel Cord and Wire Co. —

S

Seymour Smith & Son —
Sellers, Maurice —
Shallcross Mfg. Co. —
Sherron Metallic Co. —
Siemens Bros. & Co., Ltd. —
Speedometer Elec. Co. —
Stromberg-Carlson Tel. Mfg. Co. 9, 37, 43, 45, 47
Suttle Equipment Co. 54

T

Taylor-Colquitt Co. 55
Telkor, Inc. 53
Telephone Print Co. —
Telephone Repair Co. 17
Telephone Engineer 46
Texas Creosoting Co. —

U

Unique Mfg. Co. 60
Union Carbide & Carbon Co. 18
U. S. Steel Corp. 38-39
U. S. Independent Tel. Assn. —

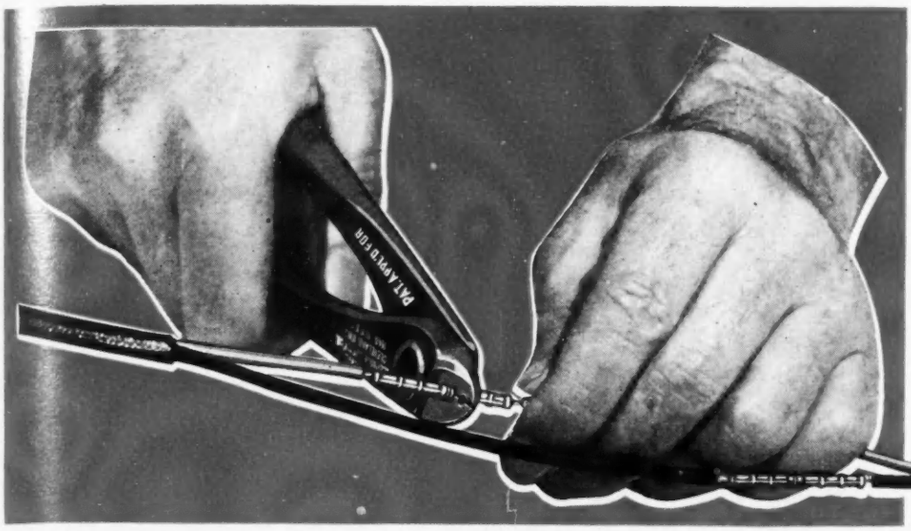
V

Valentine & Clark Corp. 60

W

Wagner Malleable Products Co. 47
Western Electric Co. —
Williams, Geo. E. —
Wopat, J. W. 60
Wray, J. G. & Co. 60

JUST INSERT WIRES IN SLEEVE and PRESS—



That's How Easy It Is To Make *Nicopress*

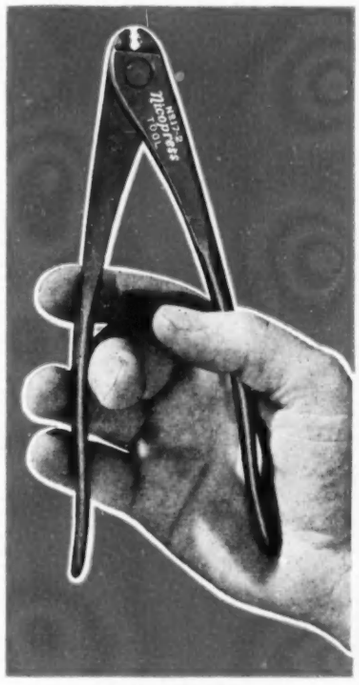
Splices on
DROP WIRES
INSIDE WIRES
BRIDLE WIRES

SPEED AND EFFICIENCY ARE INCREASED— EXPENSE AND TIME SAVED WITH THE *Nicopress* METHOD OF SPLICING . . .

The illustration above shows how very easy it is to make splices on Drop, Inside and Bridle wires by the Nicopress Compression Method. There is no fuss or bother, no danger of damaging the wires and even an inexperienced man will make neat appearing joints. And as the splices are small in diameter, only slightly larger than the wire, they are simple to tape.

The completed splice is tight and strong equalling the breaking strength of the wire.

Experience has proved beyond question that the use of Nicopress Sleeves and the light easy-to-handle, compact Nicopress tools is the most practical, economical and efficient method of splicing Drop, Bridle and Inside wires. Once you've used Nicopress you'll wonder how you ever got along without it. Nicopress Sleeves are available for Copper, Copperweld, Galvanized Iron and Bronze wire in a size range from 22 B&S to 14 B&S.



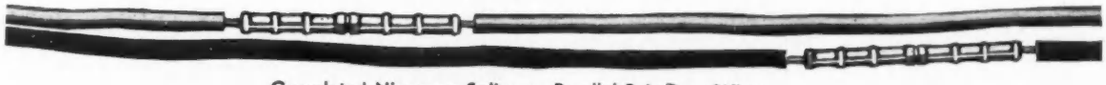
No. 17-2 Two Grooved Nicopress Tool

ORDER FROM YOUR JOBBER—TODAY

Nicopress Sleeve for Inside Wires

Complete Nicopress Splice on Twisted Pair Wires

Nicopress Drop Wire Sleeve



Completed Nicopress Splice on Parallel Pair Drop Wires

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